ZSI. 18. I
1,000

THE FAUNA OF INDIA

AND

THE ADJACENT COUNTRIES

Edited by
LT.-COL. R. B. SEYMOUR SEWELL
and
DR. M. L. ROONWAL

DIPTERA

Vol. 7

MUSCIDAE

Part 1

by
DR. F. I. VAN EMDEN

Issued by the Zoological Survey of India, Calcutta
Published by the Manager of Publications,
Government of India, Delhi
Printed in India by the Baptist Mission Press, Calcutta
1965

© COPYRIGHT, 1965, BY GOVERNMENT OF INDIA

Published in June, 1965

Price : Inland Rs.27·50 P.
Foreign 64*s*. 2*d*. or 9$ 90 cents

EDITOR'S PREFACE

The present volume by the late Dr. F van Emden constitutes part 1 of volume 7 in the Diptera series and deals with the first half of the family Muscidae, namely, the subfamilies Muscinae, Stomoxydinae and Phaoniinae. The remaining four subfamilies, namely, the Coenosiinae, Lispinae, Finniinae and Anthomyiinae, will be dealt with in the second part in due course of time.

The volume opens with a brief account of the external morphology of the family, followed by a short comparative account of the early stages such as the egg, larva and pupa. Then is given a short account of biology. The author has provided keys to the families of the Diptera Calyptera, and to the subfamilies of the Muscidae. Thereafter the three subfamilies dealt with in this volume are taken up one by one. The account of each subfamily opens with a key to the genera of that subfamily, followed by keys to the species under each genus. Then are given descriptions of the various genera, species and subspecies in the usual manner. The volume is fully illustrated by numerous clear line-drawings which greatly facilitate identification. A total of 294 species are dealt with in this volume and this number includes several new ones.

Unfortunately, while the volume was in the press the author died, My colleague, the co-editor, Lieut.-Col. R. B. S. Sewell, also, to my further regret, died recently before the final publication of the volume.

I am grateful to my colleague, Dr. A. P. Kapur, Deputy Director, Zoological Survey of India, for his kind assistance in various ways.

M. L. ROONWAL
Director
Zoological Survey of India

CALCUTTA
20th April, 1964

AUTHOR'S PREFACE

Vol. VI of the Diptera (Calliphoridae) was originally intended to include the Muscidae in the restricted sense, i.e., Muscinae and Stomoxydinae. In 1935, Miss Daphne Aubertin resigned from the staff of the British Museum (Natural History), having already prepared a substantial manuscript on these groups. In 1938, at her suggestion and that of the late R. Senior White, I agreed to work out the Muscidae. I obtained considerable assistance from Miss Aubertin's manuscript and am very grateful to her, Mr. Senior White and Col. Seymour Sewell for entrusting the work on the two subfamilies to me. In the intervening 18 years the original manuscript has been entirely redrafted, and many additional species were incorporated. At my request the inclusion of the other subfamilies of the Muscidae in the modern sense and of the Cordyluridae was sanctioned, for which I would like to express my gratitude to Col. Seymour Sewell. The material of the Indian Museum, Calcutta, and large collections belonging to the U.S. National Museum of Washington, Museum Zoologicum of Helsinki, Federated Malay States Museum of Kuala Lumpur, as well as various smaller collections sent to the Commonwealth Institute of Entomology for identification, were worked out, and the material of the British Museum-Colombo Museum Expedition to S. India was studied in connection with the preparation of the manuscript. As I realized that the material was still very scanty as compared with the amount available for my studies on Ethiopian Muscidae (1939–1951, B.M. Ruwenzori Exp. II, pp. 49–255, 325–710) I gladly consented to include the Muscidae collected by Dr. R. Malaise in N.E. Burma. When the manuscript was practically finished Dr. Fred Keiser's large collection of Ceylon Muscidae—*c.* 2,000 specimens belonging to the Natural History Museum of Basle—became available, and the results of its study have also been incorporated. The manuscript which is now to be published is therefore much larger in volume and scope than was planned originally, and it proves to be much too large for one volume, so that an additional half-volume to include the Coenosiinae, Lispinae, Fanniinae, Anthomyiinae and Cordyluridae has been authorized.

My thanks are due to the authorities of the above Museums and the owners of the various collections involved,

both for making their material available, thus enabling this volume to be much less incomplete than it would otherwise have been, and for presenting duplicates to the British Museum (Natural History), to the authorities of the latter Museum for making its working facilities freely available, and for supplying the photographs on Plates 1 and 2 and the drawing reproduced in Fig. 4, and to Dr. W J. Hall, C.M.G., Director of the Commonwealth Institute of Entomology, and his predecessors for encouraging this work in every regard. I am very grateful for the loan of types to Dr. M. Beier of the Vienna Museum, Dr. F Capra of the Genova Museum, Mr. J. E. Collin of Newmarket, Prof. W Hennig of Deutsches Entomologisches Institut, Dr. A. P. Kapur of the Indian Museum, Dr. G. Kruseman of the Amsterdam Museum, Dr. R. Malaise of the Stockholm Museum, Prof. F Peus of the Berlin Museum, Dr. A. Soós of the Budapest Museum and Dr. S. L. Tuxen of the Copenhagen Museum. Valuable information on types and on other questions connected with the preparation of this volume was obtained from Mr. J. E. Collin, Prof. W Hennig, Dr. S. V Peris, Dr. O. Ringdahl, Prof. E. Séguy, Dr. F Snyder, Mr. W H. T. Tams and Dr. S. L. Tuxen. I have already expressed my gratitude to Miss Aubertin and the late R. Senior White, and there remains only the pleasant duty of thanking Col. Seymour Sewell for his patience with the delay in finishing this volume, his steady encouragement and the painstaking work spent in seeing the manuscript through the press.

The figures marked B. H. were prepared for Miss Aubertin by Miss Barbara Hopkins and were kindly given to me by the former. Fig. 4 was drawn by Miss M. Mackay for B.M. Ruwenzori Expedition, Vol. II, and is reproduced by permission of the Trustees of the Museum. The originals of Fig. 9 I owe to Prof. W Hennig. The figures marked C. O'B. are the work of Mrs. C. A. O'Brien, and I am grateful to her for the conscientious execution of the drawings. The remaining original drawings were made by myself with the aid of a camera lucida.

SYSTEMATIC CONTENTS

	Page
Fam. Muscidae	33
Subfam. MUSCINAE	36
Genus 1. *Musca* Linnaeus	40
Subgenus *Musca* s. str.	53
1. *domestica* Linnaeus	54
1*a*. ,, *vicina* Macquart	55
1*b*. ,, *nebulo* Fabricius	55
Subgenus *Lissosterna* Bezzi	56
2. *albina* Wiedemann	56
Subgenus *Plaxemyia* Robineau-Desvoidy	57
3. *vitripennis* Meigen	57
4. *interrupta pilifacies* ssp. n.	58
Subgenus *Byomyia* Robineau-Desvoidy	60
5. *ventrosa* Wiedemann	60
6. *sorbens* Wiedemann	61
7. *lucens* Villeneuve	63
8. *pattoni* Austen	64
9. *tempestiva* Fallén	65
10. *fasciata* Stein	67
11. *conducens* Walker	68
12. *planiceps* Wiedemann	70
Subgenus *Philaematomyia* Austen	71
13. *crassirostris* Stein	71
Subgenus *Eumusca* Townsend	72
14. *senior whitei* Patton ..	73
15. *xanthomelas* Wiedemann	74
16. *hervei* Villeneuve	75
17. *craggi* Patton ..	77
18. *autumnalis* DeGeer	78
19. *lusoria* Wiedemann .	79
20. *fletcheri* Patton and Senior White	80
21. *villeneuvei* Patton	81
Subgenus *Viviparomusca* Townsend	82
22. *bezzii* Patton and Cragg	83
23. *bakeri illingworthi* Patton	84
24. *gibsoni* Patton and Cragg	86
25. *formosana* Malloch	88
Subgenus *Ptilolepis* Bezzi	89
26. *inferior* Stein	89
Subgenus *Setimusca* sbg. n.	91
27. *malaisei* sp. n.	91
Genus 2. *Morellia* Robineau-Desvoidy	92
28. *ophyroides* sp. n.	97
29. *chrysomyzina* sp. n.	98
30. *viridaurea* sp. n.	100
31. *albisquama* sp. n.	101
32. *brunneisquama* sp. n.	102
33. *hortorum cashmirana* ssp. n.	104

	Page
34. *quadriremis* sp. n.	105
35. *sordidisquama* Stein	107
36. *nigrisquama* Malloch	108
37*a*. *hortensia* (Wiedemann)	108
37*b*. *hortensia hortulana* (Wiedemann)	110
38. *biseta* sp. n.	110
39. *pectinipes* sp. n.	112
40. *affixa* Walker	113
Genus 3. *Mesembrina* Meigen	114
41. *aurocaudata* sp. n.	115
Genus 4. *Orthellia* Robineau-Desvoidy	116
42. *caesarion* (Meigen)	121
43. *fletcheri* sp. n.	122
44. *rufitarsis* (Stein)	123
45. *coerulea* (Wiedemann)	124
46. *steini* Aubertin	125
47. *indica* (Robineau-Desvoidy)	126
48. *coeruleifrons* (Macquart)	127
49. *lauta* (Wiedemann)	128
50. *claripennis* Malloch	130
51. *chalybea faceta* (Enderlein)	131
52. *diffidens* (Walker)	132
Genus 5. *Pyrellia* Robineau-Desvoidy	134
53. *scintillans* Bigot	135
54. *cadaverina* (Linnaeus)	136
55. *purpureonitens* sp. n.	137
56. *proferens* Walker	138
Genus 6. *Dasyphora* Robineau-Desvoidy	139
57. *versicolor* (Meigen)	141
58. *saltuum* Rondani	143
59. *cyanicolor kempi* ssp. n.	144
Subgenus *Rypellia* Malloch	145
60. *malaisei* sp. n.	145
61. *flavipes* Malloch	146
62. *flavipennis* sp. n.	147
Genus 7. *Polietes* Rondani	148
Subgenus *Pseudomorellia* Ringdahl	149
63. *albolineatus fuscisquamosus* ssp. n.	149
Subfam. STOMOXYDINAE	150
Genus 8. *Stygeromyia* Austen	153
64. *maculosa* Austen	154
Genus 9. *Stomoxys* Geoffroy St. Hilaire	156
65. *calcitrans* (Linnaeus)	160
66. *indica* Picard	161
67. *bengalensis* Picard	163
68. *dubitalis* Malloch	165
69. *pulla* Austen	166

Page

Genus 10. *Haematostoma* Malloch 167
70. *austeni* Malloch 167

Genus 11. *Haematobia* Lepeletier de St. Fargeau and Serville 168
Subgenus *Haematobia* s. str. 171
71. *sanguisugens* Austen 171
Subgenus *Bdellolarynx* Austen 172
72. *sanguinolenta* Austen 172

Genus 12. *Lyperosia* Rondani 173
Subgenus *Lyperosia* Rondani s. str. 175
73. *exigua* de Meijere 176
Subgenus *Glossinella* Grünb. 178
74. *minuta* Bezzi 178
75. *titillans* Bezzi 179

Subfam. PHAONIINAE 180

Tribe PHAONIINI 185

Genus 13. *Synthesiomyia* Brauer and Bergenstamm 191
76. *nudiseta* v. d. Wulp 192

Genus 14. *Passeromyia* Rodhain and Villeneuve 194
77. *heterochaeta* (Villeneuve) 195

Genus 15. *Steelea* gen. n. 196
78. *pales* sp. n. 197

Genus 16. *Fraseria* Malloch 199
79. *fulvomaculata* Malloch 200

Genus 17. *Phaonina* gen. n. 201
80. *corbetti* (Malloch) 202

Genus 18. *Phaonidia* gen. n. 203
81. *calyptrata* sp. n. 204

Genus 19. *Rhynchomydaea* Malloch 206
82. *tuberculifacies* (Stein) 207

Genus 20. *Pictia* Malloch 210
83. *xanthoceras* (Walker) 210

Genus 21. *Buccophaonia* gen. n. 212
84. *subcostalis* sp. n. 213

Genus 22. *Muscina* Robineau-Desvoidy 215
85. *stabulans* (Fallén) 216

Genus 23. *Phaonia* Robineau-Desvoidy 217
86. *atronitens* Malloch 228
87. *proocellata* sp. n. 229
88. *luteipes* sp. n. 231
89. *thomsoni* Malloch .. 232
90. *oxystoma* sp. n. 233
91. *kambaitiana* sp. n. 236
92. *oxystomodes* sp. n. 237
93. *heteromma* sp. n. 238

Page

34. *quadriremis* sp. n. 105
35. *sordidisquama* Stein 107
36. *nigrisquama* Malloch 108
37*a*. *hortensia* (Wiedemann) 108
37*b*. *hortensia hortulana* (Wiedemann) 110
38. *biseta* sp. n. 110
39. *pectinipes* sp. n. 112
40. *affixa* Walker 113

Genus 3. *Mesembrina* Meigen 114
41. *aurocaudata* sp. n. 115

Genus 4. *Orthellia* Robineau-Desvoidy 116
42. *caesarion* (Meigen) 121
43. *fletcheri* sp. n. 122
44. *rufitarsis* (Stein) 123
45. *coerulea* (Wiedemann) 124
46. *steini* Aubertin 125
47. *indica* (Robineau-Desvoidy) 126
48. *coeruleifrons* (Macquart) 127
49. *lauta* (Wiedemann) 128
50. *claripennis* Malloch 130
51. *chalybea faceta* (Enderlein) 131
52. *diffidens* (Walker) 132

Genus 5. *Pyrellia* Robineau-Desvoidy 134
53. *scintillans* Bigot 135
54. *cadaverina* (Linnaeus) 136
55. *purpureonitens* sp. n. 137
56. *proferens* Walker 138

Genus 6. *Dasyphora* Robineau-Desvoidy 139
57. *versicolor* (Meigen) 141
58. *saltuum* Rondani 143
59. *cyanicolor kempi* ssp. n. 144
Subgenus *Rypellia* Malloch 145
60. *malaisei* sp. n. 145
61. *flavipes* Malloch 146
62. *flavipennis* sp. n. 147

Genus 7. *Polietes* Rondani 148
Subgenus *Pseudomorellia* Ringdahl 149
63. *albolineatus fuscisquamosus* ssp. n. 149

Subfam. STOMOXYDINAE 150

Genus 8. *Stygeromyia* Austen 153
64. *maculosa* Austen 154

Genus 9. *Stomoxys* Geoffroy St. Hilaire 156
65. *calcitrans* (Linnaeus) 160
66. *indica* Picard .. 161
67. *bengalensis* Picard 163
68. *dubitalis* Malloch 165
69. *pulla* Austen 166

Page

Genus 10. *Haematostoma* Malloch 167
70. *austeni* Malloch 167

Genus 11. *Haematobia* Lepeletier de St. Fargeau and Serville 168
Subgenus *Haematobia* s. str. 171
71. *sanguisugens* Austen 171
Subgenus *Bdellolarynx* Austen 172
72. *sanguinolenta* Austen 172

Genus 12. *Lyperosia* Rondani 173
Subgenus *Lyperosia* Rondani s. str. 175
73. *exigua* de Meijere 176
Subgenus *Glossinella* Grünb. 178
74. *minuta* Bezzi 178
75. *titillans* Bezzi 179

Subfam. PHAONIINAE 180

Tribe PHAONIINI 185

Genus 13. *Synthesiomyia* Brauer and Bergenstamm 191
76. *nudiseta* v. d. Wulp 192

Genus 14. *Passeromyia* Rodhain and Villeneuve 194
77. *heterochaeta* (Villeneuve) 195

Genus 15. *Steelea* gen. n. 196
78. *pales* sp. n. 197

Genus 16. *Fraseria* Malloch 199
79. *fulvomaculata* Malloch 200

Genus 17. *Phaonina* gen. n. 201
80. *corbetti* (Malloch) 202

Genus 18. *Phaonidia* gen. n. 203
81. *calyptrata* sp. n. 204

Genus 19. *Rhynchomydaea* Malloch 206
82. *tuberculifacies* (Stein) 207

Genus 20. *Pictia* Malloch 210
83. *xanthoceras* (Walker) 210

Genus 21. *Buccophaonia* gen. n. 212
84. *subcostalis* sp. n. 213

Genus 22. *Muscina* Robineau-Desvoidy 215
85. *stabulans* (Fallén) 216

Genus 23. *Phaonia* Robineau-Desvoidy . 217
86. *atronitens* Malloch 228
87. *proocellata* sp. n. 229
88. *luteipes* sp. n. 231
89. *thomsoni* Malloch .. 232
90. *oxystoma* sp. n. . 233
91. *kambaitiana* sp. n. 236
92. *oxystomodes* sp. n. 237
93. *heteromma* sp. n. 238

		Page
94.	*acrostichalis* sp. n.	240
95.	*latecostata* sp. n.	241
96.	*flavinota* sp. n.	242
97.	*rubriventris* sp. n.	243
98.	*glauca* Malloch	245
99.	*venisetosa* sp. n.	246
100.	*basichaeta* sp. n.	247
101.	*xanthopleura* sp. n.	250
102.	*rectinervis* sp. n.	251
103.	*flavomaculata* Malloch	253
104.	*apicefemoralis* sp. n.	254
105.	*freyana* sp. n.	256
106.	*malaiseana* sp. n.	257
107.	*longiplumosa* sp. n.	258
108.	*macrostemma* sp. n.	259
109.	*cilitibia* sp. n.	261
110.	*breviplumosa* sp. n.	262
111.	*longipalpis* sp. n.	264
112.	*magnipalpis* sp. n.	265
113.	*simulans* Malloch	267
114.	*kashmirensis* Malloch	269
115.	*auricoxa* sp. n.	270
116.	*acerba* Stein	271
117.	*curviseta* sp. n.	273
118.	*interfrontalis* sp. n.	275
119.	*atkinsoni* sp. n.	276
120.	*coeruleicolor* Stein	277
121.	*fuscicoxa* sp. n.	278
122.	*debilis* Stein	279
123.	*seriesetosa* sp. n.	280
124.	*triseriata* sp. n.	282
Genus 24.	*Dendrophaonia* Malloch	283
125.	*querceti* Bouché	284
Genus 25.	*Pogonomyia* Rondani	286
126.	*fumipennis* Malloch	287
Genus 26.	*Megophyra* gen. n.	289
127.	*penicillata* sp. n.	292
128.	*intraalaris* sp. n.	294
129.	*fuscitibia* sp. n.	295
130.	*hirtitibia* sp. n.	296
131.	*simplicipes* sp. n.	297
Genus 27.	*Ophyra* Robineau-Desvoidy	298
132.	*chalcogaster* (Wiedemann)	301
133.	*leucostoma* (Wiedemann)	302
134.	*nigra* (Wiedemann)	303
135.	*capensis* (Wiedemann)	305
136.	*obscurifrons* Sabrosky	307
Genus 28.	*Hydrotaea* Robineau-Desvoidy	307
137.	*jacobsoni* (Stein)	312
138.	*australis* Malloch	314
139.	*affinis* Karl	315

Page

140. *cilifemorata* sp. n. 317
141. *malaisei* sp. n. 319
142. *armipes* (Fallén) 320
143. *atrisquama* Ringdahl 321
144. *dentipes* (Fabricius) 323
145. *occulta* (Meigen) 325
146. *cyrtoneurina* (Zetterstedt) 326
147. *lasiopa* sp. n. 328

Genus 29. *Azelia* Robineau-Desvoidy 330

148. *nuditibia* sp. n. 331

Tribe DICHAETOMYIINI 332

Genus 30. *Dichaetomyia* Malloch 333

149. *simulans* (Stein) 347
150. *pallitarsis* (Stein) 348
151*a*. *malayana* Malloch 349
151*b*. *malayana tamil* ssp. n. .. 352
152. *senior whitei* sp. n. 352
153. *keiseri* sp. n. 354
154. *phaeocnemis* sp. n. 355
155*a*. *nubiana* (Bigot) 357
155*b*. *nubiana aureomarginata* ssp. n. 358
156. *peroë* (Walker) 359
157*a*. *quadrata* (Wiedemann) 360
157*b*. *quadrata monticola* ssp. n. 361
158. *dichaeta* sp. n. 361
159. *curvivena* sp. n. 362
160. *dorsocentralis* sp. n. 364
161. *bibax* (Wiedemann) 365
162. *flavipalpis* Stein 367
163. *indica* (Walker) 369
164. *acrostichalis* sp. n. 371
165. *aurantiaca* sp. n. 372
166. *brunneofemorata* sp. n. 373
167. *fusciventris* sp. n. 374
168*a*. *prolixa bioculata* ssp. n. 375
168*b*. *prolixa pallidorsis* ssp. n. 377
169. *pallens* (Stein) 378
170. *manca* sp. n. 379
171. *heterocnemis* sp. n. 381
172. *latitarsis* (Stein) 383
173. *heteromma* sp. n. 385
174. *holoxantha* sp. n. 387
175. *varipalpis* sp. n. 388
176. *nigricauda* sp. n. 390
177. *fulvoapicata* sp. n. 391
178. *persimilis* sp. n. 393
179. *splendida* (Stein) 393
180. *umbrosa* sp. n. 396
181. *flavocaudata* Malloch 398
182. *subumbrosa* sp. n. 398
183. *varicauda* sp. n. 400
184. *handschini* sp. n. 403
185. *setifemur* Malloch 404

		Page
186.	*brunneitibia* sp. n.	406
187.	*apicalis* (Stein)	408
188.	*pilinervis* Malloch	410
189.	*nigridorsata* sp. n.	412
190.	*curvimedia* sp. n.	413
191.	*melanotela* sp. n.	415
192.	*latistriata* Malloch	417
193.	*pectinipes* (Stein)	419
194.	*pahangensis* Malloch	421
195.	*pendleburyi* Malloch	423
Genus 31.	*Tamilomyia* gen. n.	425
196.	*dichaetomyiina* sp. n.	426
Tribe MYDAEINI		427
Genus 32.	*Xenosia* Malloch	428
197.	*steini* sp. n.	430
198*a*.	*bina* (Wiedemann)	432
198*b*.	*bina brunneifemorata* ssp. n.	433
Genus 33.	*Xenosina* Malloch	433
199.	*lasiophthalma* sp. n.	440
200.	*trochanterata* sp. n.	442
201.	*tenax* (Stein)	442
202.	*femorata* Malloch	444
203*a*.	*tarsalis* Malloch	446
203*b*.	*tarsalis* f. *scutellaris* Malloch	448
204.	*setipennis* Malloch	448
205.	*elongata* sp. n.	450
206.	*pudica rufomarginata* Malloch	451
207.	*flavipennis* (Malloch)	453
208.	*ruficollis* sp. n.	454
209.	*morosa* (Stein)	455
210.	*canoapicata* sp. n.	457
211.	*lauta* (Stein)	458
212.	*solennis* (Walker)	460
213.	*dissimilis* sp. n.	462
214.	*sordida* (Stein)	463
215.	*orientalis* (Malloch)	464
216*a*.	*similis* (Malloch)	466
216*b*.	*similis septentrionalis* ssp. n.	467
Genus 34.	*Mydaea* Robineau-Desvoidy	468
Subgenus *Myiospila* Rondani		472
217.	*meditabunda angustifrons* Malloch	472
Subgenus *Mydaea* (s. str.)		475
218.	*euspilariodes* sp. n.	475
219.	*flavitarsata* sp. n.	477
220.	*longicornis* Stein	478
221.	*secunda* (Malloch)	480
222.	*kambaitiana* sp. n.	481
223.	*xanthopus* sp. n.	483
224.	*piceitarsis* sp. n.	484
225.	*malaiseana* sp. n.	485
226.	*longiscutellata* sp. n.	486

	Page
Subgenus *Eumyiospila* Malloch	488
227. *pellucida* (Stein)	488
228. *argentata* (Walker)	490
Genus 35. *Helina* Robineau-Desvoidy	493
Subgenus *Hebecnema* Schnabl	501
229. *trichaeta* sp. n.	502
230. *trisetosa* sp. n.	503
231. *halterata* Stein	504
232. *nigrithorax* (Stein)	507
233. *umbratica* (Meigen)	508
234. *pseudofumosa* sp. n.	510
Subgenus *Helinella* Malloch	511
235. *lenticeps* (Thomson)	511
236. *fuscisquama* (Stein)	514
Subgenus *Euspilaria* Malloch	515
237. *coronata* (Stein)	515
238. *nemorum* (Stein)	517
239. *lucorum* (Fallén)	519
Subgenus *Helina* s. str.	520
240. *cashmirensis* (Malloch)	520
241. *eurymetopa* sp. n.	522
242. *brunneigena* sp. n.	523
243. *argentigena* sp. n.	525
244. *posteroventralis* sp. n.	527
245. *pectinifemorata* sp. n.	528
246. *infranitens* sp. n.	530
247. *hirtifemorata* Malloch	532
248. *appendiculata* (Stein)	534
249. *uliginosa* (Fallén)	535
250. *nervosa* (Stein)	537
251. *breviplumosa* sp. n.	539
252. *tibiella* (Stein)	540
Tribe LIMNOPHORINI	541
Genus 36. *Graphomyia* Robineau-Desvoidy	544
253. *adumbrata* (Wiedemann)	546
254. *atripes* Malloch	548
255. *stipata rufitibia* Stein	550
256. *maculata* (Scopoli)	552
Genus 37. *Limnophora* Robineau-Desvoidy	554
Subgenus *Limnophora* s. str.	562
257. *albonigra* sp. n.	562
258. *geminimaculata* sp. n.	564
259. *mallochi* sp. n.	566
260. *latiseta* sp. n.	568
261. *albitarsis* Stein	570
262. *angustatifrons* sp. n.	571
263. *fallax* Stein	573
264. *prominens* Stein	574
265. *angustibucca* sp. n.	576
266. *pendleburyi* sp. n.	578
267. *brunnescens* sp. n.	580
268. *breviceps* sp. n.	582

		Page
269.	*argentata* sp. n.	583
270.	*subplumosa* sp. n.	585
271.	*pubiseta* sp. n.	587
272.	*tinctipennis* Stein	588
273.	*plumiseta* Stein	589
274.	*himalayensis* Brunetti	591
275.	*malaisei* sp. n.	593
276.	*glaucescens* sp. n.	594
277.	*perakensis* Malloch	596
278.	*apiciseta* sp. n.	598
279.	*virago* sp. n.	600
280.	*conica* Stein	602
Subgenus *Heliographa* Malloch		604
281.	*insignis* Stein	604
282.	*ceylanica* sp. n.	607
283.	*tonsa* Stein	609
Genus 38.	*Spilogona* Schnabl and Dziedzicki	611
284.	*dimorpha* sp. n.	612
285.	*heliniformis* sp. n.	615
286.	*abnormis* (Stein)	616
Genus 39.	*Anaclysta* Brauer and Bergenstamm	618
287.	*flexa* (Wiedemann)	619
Genus 40.	*Gymnodia* Robineau-Desvoidy	621
288.	*subtilis* (Stein)	624
289.	*ascendens* (Stein)	626
290.	*interposita* sp. n.	628
291.	*distincta* (Stein)	630
292.	*tonitrui* (Wiedemann)	631
293.	*parascendens* Hennig	633
294.	*lasiopa* sp. n.	636

General Remarks

In view of the space taken up by the systematic part, the following introductory chapters have been kept as brief as possible. In the volume on Calliphoridae (*Diptera*, VI, 1940) Senior White, Aubertin and Smart have presented an elaborate account of the external and internal morphology, so it will suffice to illustrate and explain the terms adopted in the keys and descriptions of the present volume. The chapter 'Collecting and Mounting' in the Calliphorid volume also applies largely to the Muscidae, but it was necessary to deal separately with the early stages and biology.

Morphology

Head (Figs. 1 and 2): Flies, or their heads, are called *holoptic* if the *interfrontalia* (*if*), the membraneous median strip of the frons which is an extension of the ptilinum, are reduced and the eyes more or less strongly approximated (Fig. 2), as is the case in the majority of males in Muscinae, Phaoniinae, Anthomyiinae, etc. In *dichoptic* forms (Fig. 1) the eyes are more or less widely separated, and the *parafrontalia* (*pf*), the sclerotized and usually dusted strip separating the eyes from the interfrontalia, carry in addition to the *inclinate setae* (*is*) on anterior or anterior and middle part, one or two *reclinate setae* (*rs*) near level of ocelli. In dichoptic females the outer part of the parafrontalia is often furnished with one or more *proclinate setae* (*ps*) on the interfrontalia in front of ocelli with a pair of, usually small, *cruciate interfrontals* (*cr*). The three *ocelli* (*o*) are situated on the anterior and lateral declivities of the *ocellar tubercle* (*ot*), a pair of setae, the *ocellars* (*oc*), which as a rule are directed forward and outward, lying behind the anterior ocellus. The ocellar tubercle is an elevation on a flat triangular sclerite which, at least in most females, extends some distance forward, the *frontal triangle* (*ft*). The hind angles of the latter are more or less contiguous with the hind end of the parafrontalia, on which the two *verticals* are situated, the inner one (*ivs*) being curved more or less towards the middle, the outer one outwards (*ovs*). In *holoptic* forms they are usually weak or indistinct. An *occipital row* (*or*) of setulae begins to their outer side and follows the hind margin of the compound eyes, the strip between the latter and the occipital row being termed *temple*. The *occiput* (*occ*), behind the occipital

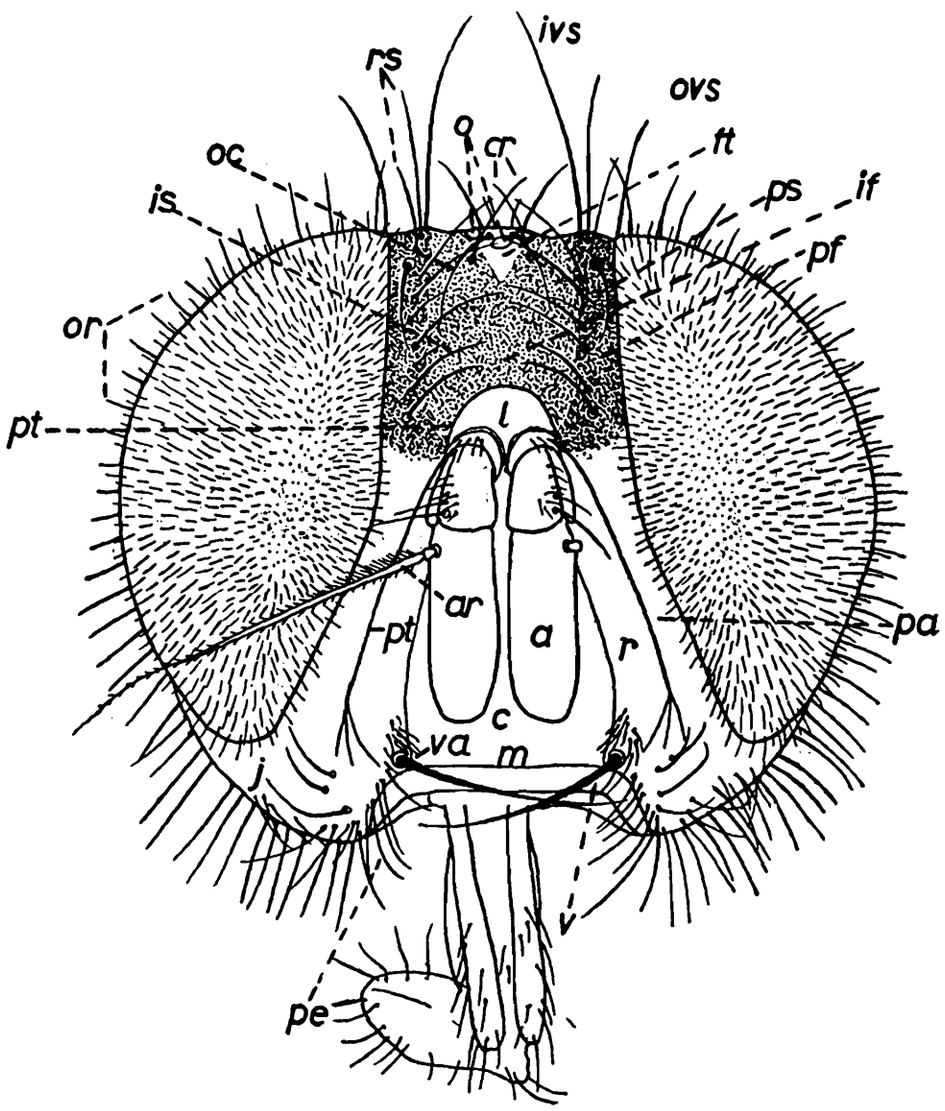


FIG. 1. *Hydrotaea lasiopa* sp. n. ♀ Front view of head. Explanation of letters in the text, pp. 1–3.

row, is usually more or less setulose, except for a vertical median strip, the *cerebrale* (*cb*), which is outwardly defined by a shallow groove. Just below the anterior end of the interfrontalia and above and between the base of the antennae, separated from the former by the *ptilinal suture* (*pt*), a small pollinose sclerite is visible, the *lunula* (*l*). To the outer side between the ptilinal suture and the eyes the *parafacialia* (*pa*) extend downward, passing gradually into the *jowls* (*j*), from the ascending upper anterior part of which they are only separated by a slight depression. The jowls run from there along the lower margin of the eye to the setulose lower part of the occiput, the upper part of the jowls being normally bare, whereas the lower part is normally occupied by a setulose and dusted tongue of the occiput, the *occipital dilation*

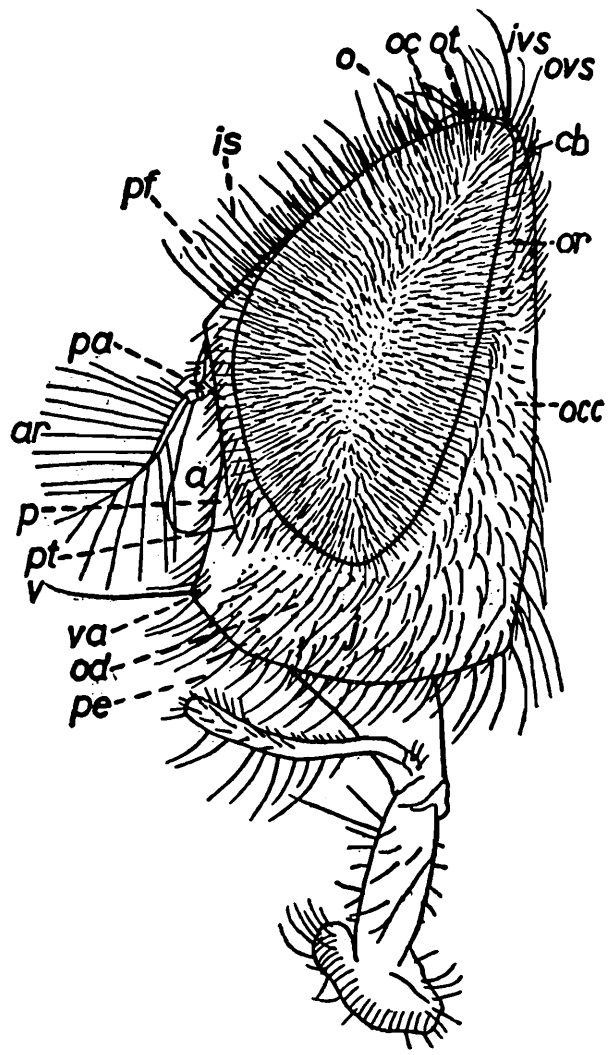


FIG. 2. *Musca malaisei* sp. n. ♂. Side view of head. Explanation of letters in the text, pp. 1–3.

(*od*). The lower part of this borders the mouth and is characterized by a row of setae, the *peristomal setae* (*pe*), which run forward and somewhat upward to the point where the lower edge of the head meets the lower end of the face at a normally somewhat projecting angle, the *vibrissal angle* (*va*), on which an especially strong seta, the *vibrissa* (*v*), is situated. Between the arms of the ptilinal suture and the *mouth-margin* (*m*) we find the *clypeus* (*c*), the outer part of which forms a ridge along the inner side of the ptilinal suture, the *facial ridge* (*r*). The proportions of the *antennal segments* (*a*) are somewhat variable, and not much use has been made of them apart from the *width* (in a dorso-ventral = antero-posterior, not a transverse, direction) of the third segment, with which for instance the over-all width of the *arista* (*ar*), *i.e.* including its fringe of hairs, is compared.

Thorax (Figs. 3 and 4): In describing the colouration, the

term *vitta* is always used for a longitudinal band and *band* for a transverse one. For example in *Phaonia latecostata* van Emden there are a pair of *oblique vittae* (*ov*) on the lateral angles of the thorax, a pair of *perpendicular vittae* (*pv*) which run on either side of the median line and an unpaired *median vitta* (*mv*) which runs from the posterior half of the thorax to the base of the scutellum. In many species the pattern of colouration and in particular the position of certain spots on the segments of the abdomen is described as 'shifting', since the position appears to change with the angle of inspection and is due to a different inclination of the tomentum. The abbreviation *acr* stands for acrostichal hairs or setae, and *dc* for the dorsocentral setae, the *prst* ones of both being those in front of the transverse *suture* (*s*) which connects the upper angles of the *notopleurae* (*n*), the *post acr* and *post dc* lying behind this suture. If the last pair of *post acr* is stronger or alone differentiated from the *acr* hairs these setae are called *prsc* (prescutellars). In front of the suture to the inner side of the posterior part of the *shoulders* (or *humeral callosity*, *h*), the posthumeral seta (*ph*) is found, which as a rule is not

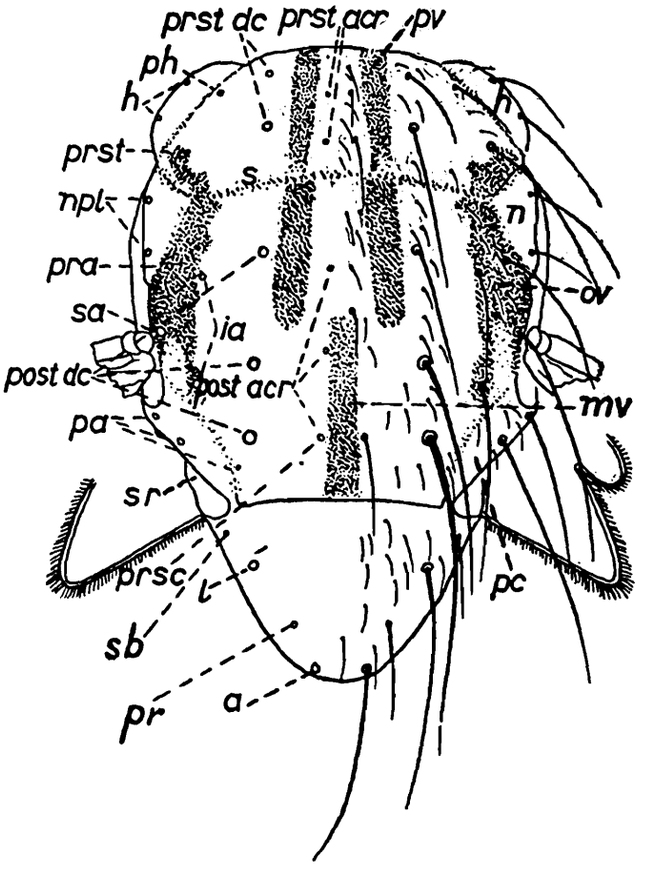


FIG. 3. *Phaonia latecostata* sp. n. Dorsal view of thorax. Explanation of letters in the text, pp. 4–6.

very strong and which may be replaced by two setae. Behind and outward to this seta the strong presutural seta (*prst*) is almost always present (missing in some *Lispe*). Outward again the triangular notopleura is defined by shallow grooves; it bears the two—less often only one—notopleurals (*npl*). Behind the suture one or two intra-alar setae (*ia*) are found outward to the *dc* row. I am not aware that a *prst ia* ever occurs in MUSCIDAE and the abbreviation *ia* therefore refers to the *post ia* only in this volume. The outermost row behind the suture is formed by 1–2 supra-alars (*sa* referring to the anterior one) and, in front of them, not far from the *sa*, the pre-alar (*pra*), which may be strong, small or missing. On the oblique callosity behind and above the wing insertion, the *postalar callosity* (*pc*), 2–3 *postalars* (*pa*) are seen. To the outer side there is a steep declivity, the *postalar declivity* (*pd*) and at its lower end, just above the inner margin of lower calyptra, a ridge, the *suprasquamal ridge* (*sr*). The *postalar declivity* (*pd*) or tympanic membrane carries a tuft of small hairs known as *tympanic tufts* (*tt*). The scutellum is furnished with one or two pairs

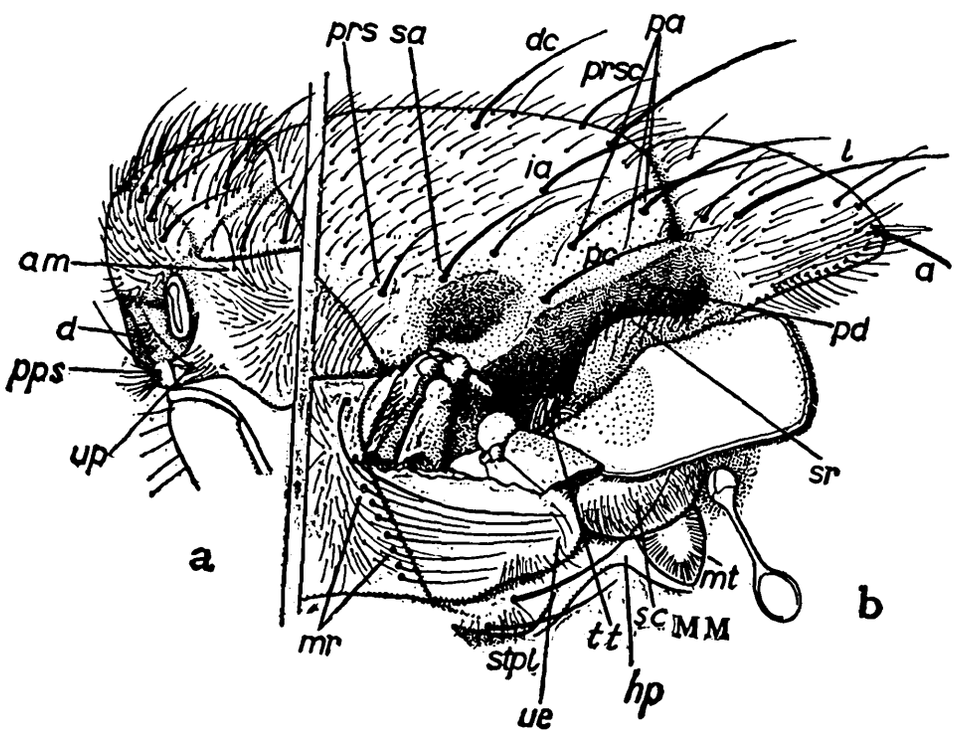


FIG. 4. (a) *Musca domestica* L. and (b) *M.* (*Viviparomusca*) *natalensis* Villen. Lateral view of thorax. Explanation of letters in the text, pp. 4–6.

of strong *marginals* (*lateral-l-* and *apical-a-* ones, the latter decussate), and usually one or more pairs of weaker *pre-apical* setae (*pr*) on dorsal surface and sometimes a third

marginal pair near base (*subbasal marginals, sb*). On the pleurae the depression just below the humeral callosity and in front of the anterior thoracic spiracle is called *propleural depression* (*d*), and the *propleural seta* (*pps*) is found on a slight prominence immediately beneath, whereas the *prostigmals* lie behind the propleurae and below the spiracle, the *lower prostigmal* (*lp*) being more or less small, the *upper prostigmal* (*up*) strong, and the *auxiliary prostigmal*, if present, above the upper one and less strong or subequal. Near upper anterior end of *mesopleura* a more or less weak *anterior mesopleural* (*am*) is usually present, whereas the hind margin of the sclerite carries the *mesopleural row* (*mr*). Just behind this and below the articulation of the wing a knob-like prominence, the *infra-alar bulla* (*ib*) (Fig. 6) is seen, and the *triangular sclerite* (*ts*) (Fig. 6) below it, which is separated from the pteropleura lying behind these structures by a shallow groove, is sometimes of a differing colour. The *upper embossed part of the pteropleura* (*ue*) (Fig. 6) is sometimes setulose, which is a character of considerable importance; in some other genera this part is devoid of setulae, but a tuft of these is found on lower part not much above the posterior *stpl.* The hindmost part of the pteropleura is conspicuously convex and is called *supraspiracular convexity* (*sc*), the metathoracic spiracle (*mt*) adjoining below. On the upper part of the sclerite below the pteropleura, the *sternopleura*, the *sternopleurals* (*stpl*) are conspicuous. One to four (seldom an accessory fifth or sixth near the lower posterior one) of these occur in MUSCIDAE, most frequently three, which are then distinguished as *anterior*, *posterior* and *lower stpl.* The lower one is usually closer to the posterior than to the anterior one, but in a fair number of cases it is equidistant from both of them, the setae being arranged in an isosceles triangle, and in a few species it is even nearer to the anterior seta. The sclerite behind the sternopleura and below the metathoracic spiracle is the *hypopleura* (*hp*); its upper anterior embossed part, which may be setulose, has been named 'beret' by Mesnil. The hypopleura may be beset with setulae, sometimes minute ones, near the spiracle or above hind coxa, but it is normally devoid of the setae which characterize the CALLIPHORIDAE (see *Diptera*, **VI**, p. 26). The setulae below anterior part of spiracle are, however, black and rather conspicuous in a few genera, especially those for which the subfamily *EGINIINAE* has been created, and in one or two extra-limital genera they are so strong and arranged in a short row, that they are not distinguishable from the hypopleural setae of the CALLI-

PHORIDAE. Above the sternopleura on the lateral part of the mesonotum, immediately below middle of base of lower calyptra, some setulose hairs are often found: these are called *infrasquamal* hairs.

Abdomen (Fig. 5): The first two connate tergites are counted as one (*1*) as in my previous papers, the corresponding ventrites are separated, however, and the—very small and short—real first ventrite is, therefore, called *ventrobasal scale* (*vs*) in the few instances in which there is reason to refer to it. The *fourth ventrite*, then, is the one which in the male forms the ventral cover for the genitalia when these are retracted. It is usually more or less excised on median line apically and thus is bilobed. The term tergite is restricted to the abdominal segments and the word 'abdominal' is therefore

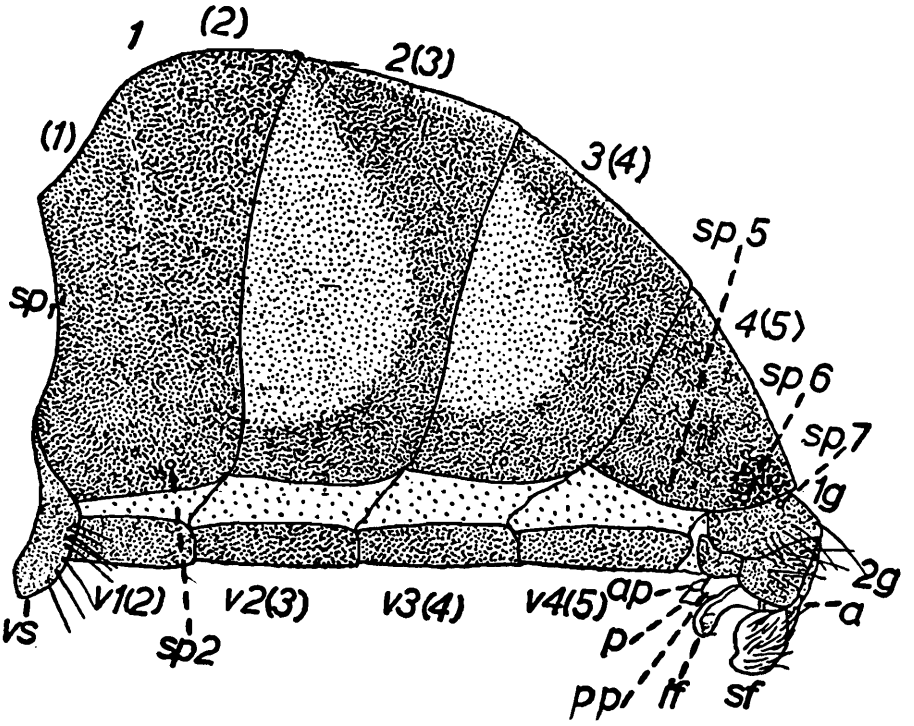
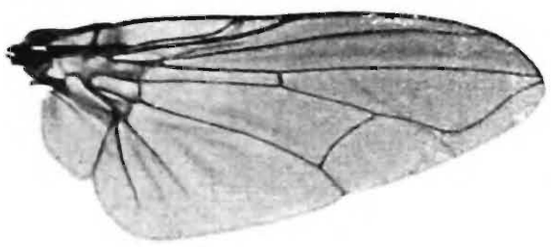


FIG. 5. *Gymnodia parascendens* Hennig ♂. Lateral view of abdomen. Explanation of letters in text, pp. 7–8.

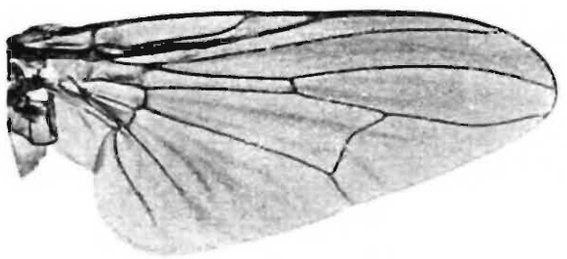
normally omitted in connection with it. The apparent fifth and sixth (actual sixth and seventh) segments are strongly reduced, and what is visible externally of the fused sixth and seventh (actual seventh and eighth) segments is often called *first genital segment* (*1g*). The actual ninth segment forms the *second genital segment* (*2g*), which is more or less strongly convex and encloses on its dorsal and posterior surface the anus (= tenth segment, *a*). In the present volume the term *hypopygium* includes the exposed parts of

both the first and second genital segments of the male. The hindmost part of the male genitalia, which is attached to the morphological hind end of the second genital segment, is the *superior forceps* (*sf*), which in MUSCIDAE is more or less fused to form a usually subtriangular plate. At the outer part of its base the paired *inferior forceps* (*if*) is inserted and between the inferior forceps, somewhat shifted forward, the *penis* (*p*) is seen, which carries at its base the posterior (*pp*) and anterior (*ap*) pair of *parameres*.

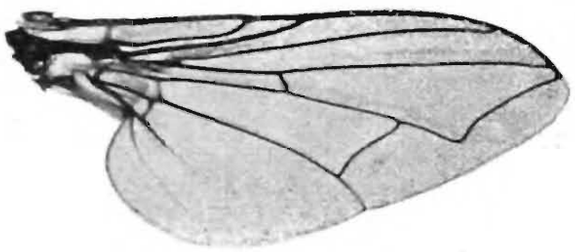
Wings (Fig. 150, p. 621, and Pl. 1) with only the usual seven longitudinal veins in addition to the *costa* (*c*) and the subcosta. The under side of *c* may be bare or hairy. In judging this character the marginal row along anterior margin of under side is disregarded, and the under side is considered as hairy only if there are irregularly arranged short hairs behind the marginal row between the *humeral cross vein* (*h*) and the apex of the *subcosta* (*sc*), the first longitudinal vein, which is, however, not counted traditionally and is often named auxiliary vein. Seen dorsally, it is a sunken or 'concave' vein, and it will be found that the wing shows a regular alternation of concave and convex veins. The next vein, r_1 or *first vein*, is a convex vein; its thickened basal part proximad to its first bifurcation is termed *stem-vein* (*sv*), and the compound vein which branches off from r_1 at the distal end of the stem-vein is r_5, which soon forms a marked *node* (*n*) at which it divides into two veins, the concave *second vein* (r_{2+3}) and the convex *third vein* (r_{4+5}). The latter is connected by a transverse vein (*r-m*) with the next concave vein, *m*. In most *MUSCINAE* *m* is bent up more or less abruptly before reaching margin of wing, and in these cases its tip lies more or less close to the tip of r_{4+5}. The bent-up part is then termed *apical cross-vein* (*ac*), and the point at which it meets the straight main part of *m* will be referred to as *the bend* (*b*). Somewhat basad to the bend another transverse vein *m-m* connects *m* with the next convex vein, the *fifth vein* (*5*). (This and the remaining veins are compound veins in MUSCIDAE and their exact composition is somewhat controversial. For these reasons the old-fashioned designations are retained here for the posterior part of the wing). The last concave or *sixth vein* (*6*) is of importance especially in defining the *ANTHOMYIINAE*. It is said to reach the margin even if only a hyaline fold extends to it (Pl. 2, fig. 15), and the character is therefore best judged if this area of the wing is studied in such a position that it reflects the light. The *seventh vein* (*7*) is even less developed. It has a special curvature in *FANNIINAE* (Pl. 2, fig. 20). The



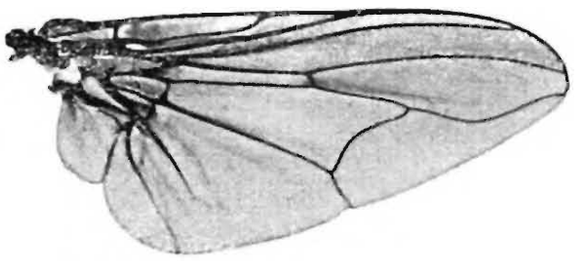
1. *Musca lucens* Villen.



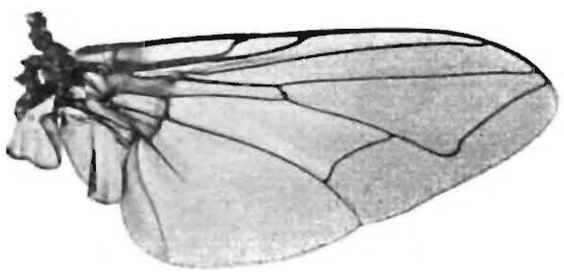
6. *Stomoxys indica* Pic.



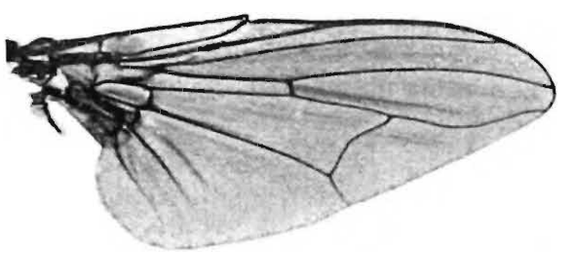
2. *Musca lusoria* Wied.



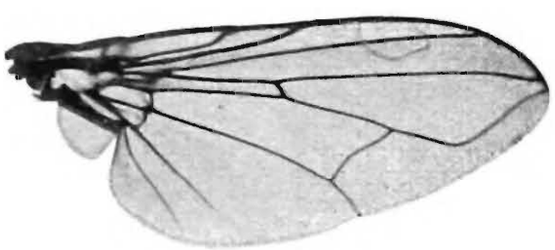
7. *Stomoxys bengalensis* Pic.



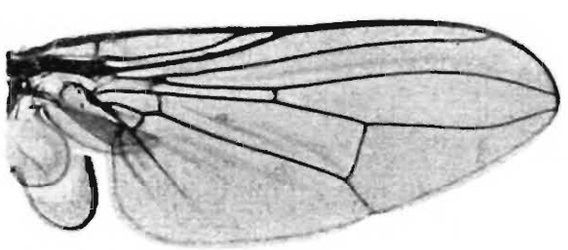
3. *Orthellia indica* R.-D.



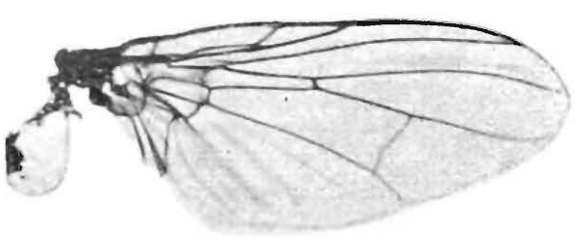
8. *Stomoxys dubitalis* Mall.



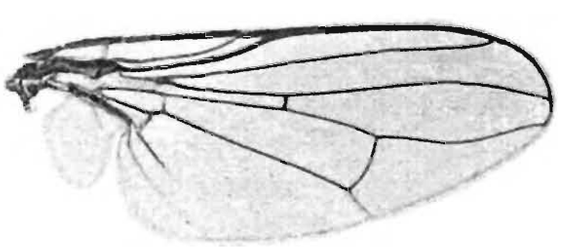
4. *Orthellia coerulea* Wied.



9. *Lyperosia exigua* Meij.

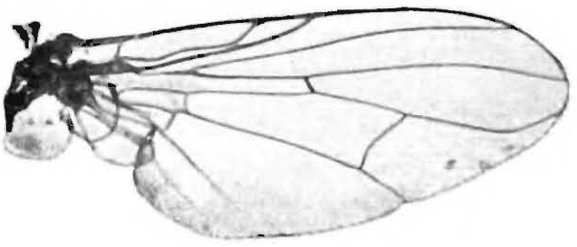


5. *Phaonina corbetti* Mall.

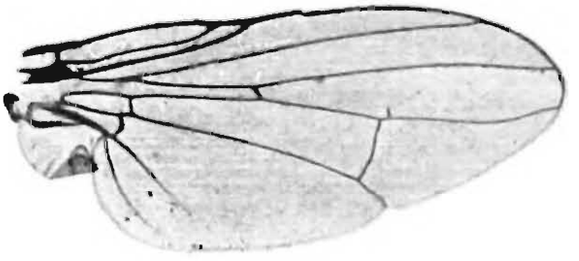


10. *Lyperosia minuta* Bez.

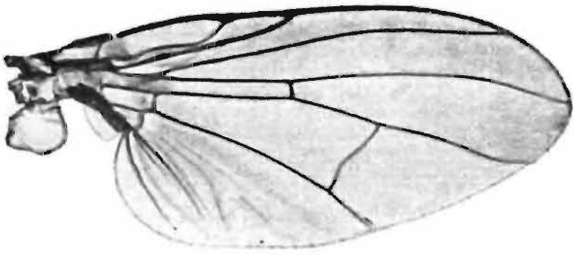
Wings of Oriental Muscinae (figs. 1–4), Stomoxydinae (figs. 6–10) and Phaoniinae (fig. 5).



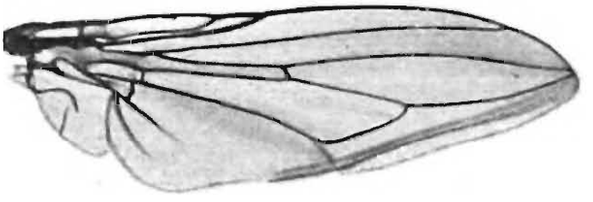
11. *Xenosia bina* Wied.



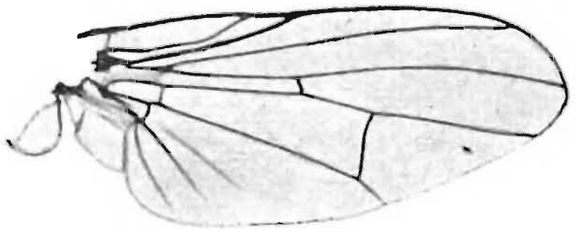
16. *Lispe longicollis* Meig.



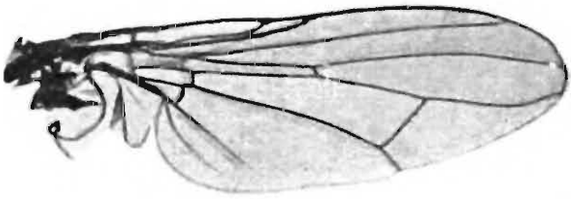
12. *Dichaetomyia brunneitibia* Emd.



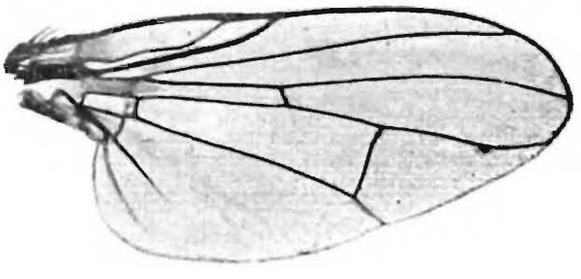
17. *Lispe glabra* Wied. ♂



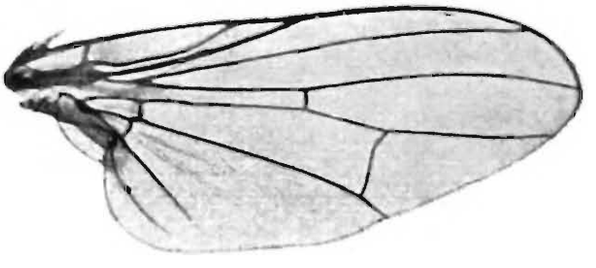
13. *Limnophora glaucescens* Emd.



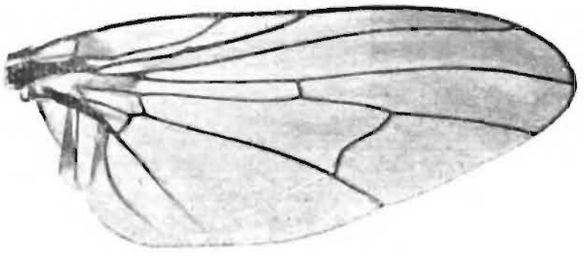
18. *Lispe glabra* Wied. ♀



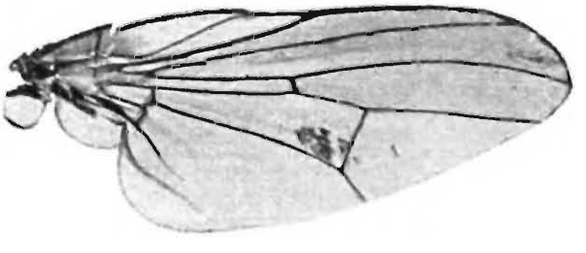
14. *Limnophora latiseta* Emd.



19. *Hydrotaea malaisei* Emd.



15. *Pegomyia detracta* Walk.



20. *Fannia spatulatides* Emd.

Wings of Oriental Phaoniinae (figs. 11–14 and 19), Lispinae (figs. 16–18), Fanniinae (fig. 20) and Anthomyiinae (fig. 15).

spaces between the veins or *cells* take their names from the vein which lies in front of them, and in the present volume they have received the same letter as abbreviations but in the form of capitals. Thus *1st C* and *2nd C* are the two cells between *c* and *sc* and separated from each other by *h*, *Sc* is the area between *sc* and r_1, R_1 the open cell between r_1 and r_{2+3}, R_3 the next and R_5 the second-next cell, the one which in *Musca* is almost closed. The cell defined by the stem-vein, basal part of r_{4+5}, *m-m* and the basal part of *m* is called the *first basal cell* (*1B*), and the small cell behind basal part of *m* the *second basal cell* (*2B*), whereas the cell behind the main part of *m* and closed by *m-m* is the *discal cell* (*D*) and the open cell between this and the sixth vein is Cu_1 or *cubital cell*. The more or less well-defined wing-lobe behind the basal cells and the basal part of the seventh vein is the *alula* (*al*), of which hardly any use has been made in the classification of the MUSCIDAE.

Structures of the Wing Base (Fig. 6): The base of the costa is covered by two small scale-like sclerites, nearer base the *epaulet* (*e*), which bears setulose hairs, and beyond it the *basicosta* (*b*), which is covered by microscopic pile only. On

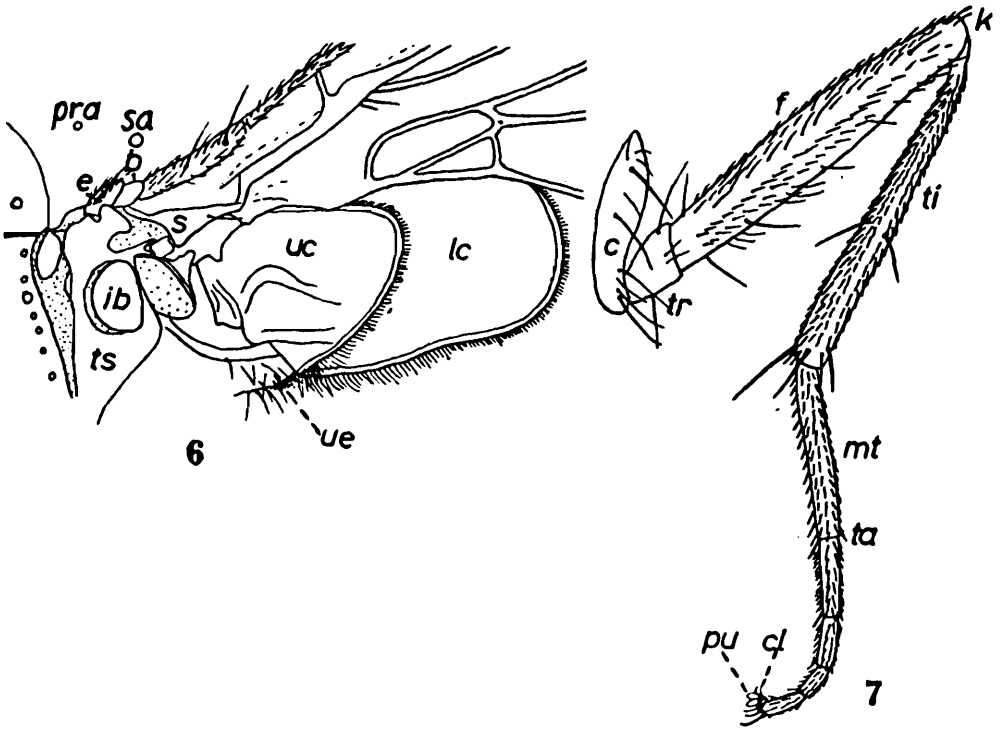


FIG. 6. *Pyrellia scintillans* Big. Structures at and near base of wing. Membraneous parts stippled. Explanation of letters in text, pp. 9–10.

FIG. 7. *Paregle cinerella* (Fln.). Anterior view of left mid leg. Explanation of letters in text, pp. 10–11.

the ventral surface the extreme base of *sc* and the stem-vein is overlaid by an elongate-triangular sclerite, the *subcostal sclerite* (*s*), on which microscopic pile and in some cases setulae will be found. The hind margin of the wing is connected with the body by two usually strongly pronounced membraneous lobes, the *upper* (*uc*) and *lower calyptra* (*lc*). Both of these have a conspicuous marginal bead and a fringe of cilia. The inner margin of the lower calyptra may diverge from the lateral margin of the scutellum from the very base onwards, in which case the apex of the lower calyptra is more strongly rounded (unless the calyptra is extremely short), often subtriangular with more or less rounded apex (*Phaonia* type, Fig. 3 and Pl. 1, fig. 10), or the inner margin of the lower calyptra follows the margin of the scutellum for a considerable distance and turns more abruptly outward into the apical margin, which in this type (the *Musca* type, Fig. 4 and Pl. 1, figs. 1, 5 and 6) is more broadly rounded or truncated.

The *Halteres* (or balancers) are relatively uniform in MUSCIDAE. Where their colour is mentioned, that of the knob only is meant unless the contrary is stated. Differences in the degree of reddishness or yellowness of pale halteres are probably in many cases due only to the state of preservation, and too much importance should not be attributed to them. In some genera where the halteres are always pale their colour has not been mentioned in the descriptions. On the other hand really dark halteres form a very useful taxonomic character and have always been duly stressed.

The *Legs* (Fig. 7) are attached to the thorax by a ball joint, which enables the basal segment, the *coxa* (*c*), to rotate in a restricted measure, its direction being in the main downward, *i.e.* away from the body. At its apex the short *trochanter* (*tr*) articulates in a dicondylous or hinge joint, turning the rest of the leg essentially outward and moving it up and down. Little movement is possible between the trochanter and the long *femur* (*f*), which has the function of removing the articulation of the more distal parts of the leg further outward. In the dicondylous *knee* (*k*) joint the leg is bent downward, and the long and thin *tibia* (*ti*) reaches the ground with its apical spurs, the five-segmented *tarsus* (*ta*) being inserted at its tip and providing a broader contact with the ground. The first tarsal segment or *metatarsus* (*mt*) is always more or less long in MUSCIDAE and the apical ones short. The terminal segment ends in a pair of *claws* (*cl*) and below them a pair of *pulvilli* (*pu*). The terms *anterior* and *posterior* apply to the anterior and posterior pairs respectively. For

describing the setae of the leg the latter is imagined extended laterally in a straight line at right angles with the body, so the four main directions dorsal (*d*), anterior (*a*), ventral (*v*) and posterior (*p*) are obtained. Between two adjacent ones of these aspects the anterodorsal (*ad*), anteroventral (*av*), posteroventral (*pv*) and posterodorsal (*pd*) positions are found. The *d* surface of the tibia is normally characterized by a very regular double row of the normal decumbent hairs, and the base of the *d* surface is always somewhat produced (if seen under strong magnification) between the two condyli of the knee to form the insertion for the tendon of the extensor muscle. On the *v* surface there is, on the contrary, a small emargination covered by the articulating membrane. It is useful to remember these morphological details in locating setae, especially if immature specimens are studied, the legs of which may have been twisted in drying up.

Anatomy

The internal morphology or anatomy has been studied in very few forms only, and no comparative account for the whole family can yet be given, the general features being of course the same as in CALLIPHORIDAE (see *Diptera*, **VI**, pp. 16–18). Detailed accounts of the anatomy of *Musca domestica* will be found in Hewitt (1907–1909, *Quart. J micr. Sci.*, **LI**, pp. 395–448; **LII**, pp. 495–545 and **LIV**, pp. 347–414), West (1951, *The Housefly*, Ithaca), that of *Stomoxys* has been studied by Tulloch (1906, *Proc. R. ent. Soc.* (B), **LXXVII**, p. 523), and that of *Glossina* by Minchin (1905, *Proc. R. ent. Soc.* (B), **LXXVI**, pp. 531–547), Newstead, Evans and Potts (1924, *Mem. Liverpool School trop. Med.* (N.S.), **I**, pp. 4–22) and Buxton (1955, *Lond. School Hyg. trop. Med. Mem.*, **X**, pp. 8–9). In addition a few representatives of the family have been studied by various authors in work on the anatomy of single structures, such as the antenna, eye, spiracular regulatory apparatus, corpora allata, etc.

Early Stages

(*a*) The Egg

The eggs (Fig. 8) are normally about 2½–5 times as long as wide, cylindrical-ovate or somewhat spindle-shaped, one surface being slightly flattened or concave and with a faint or strong longitudinal rib on each side, the other surface being evenly convex. The eggs of most groups are often deposited with the flattened area upward, and authors differ

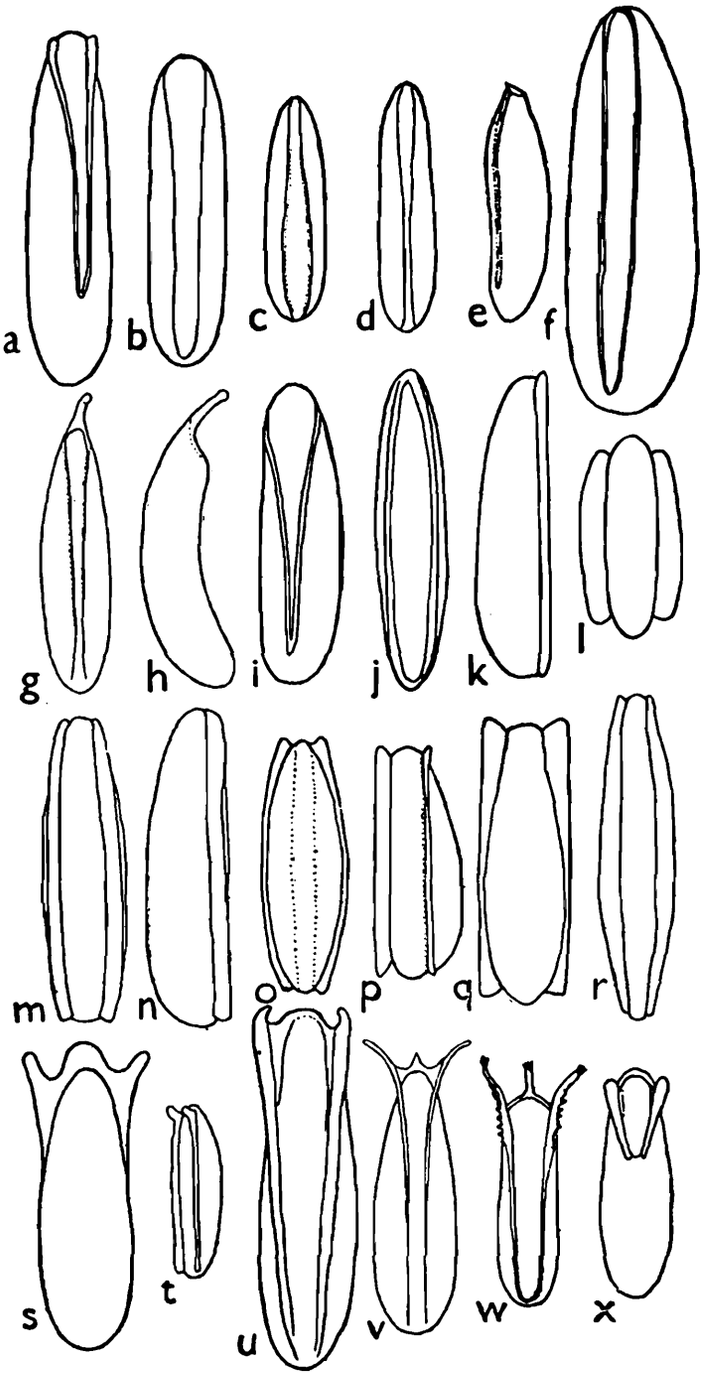


FIG. 8. Types of eggs. (Not to the same scale). (*a*) *Paregle cinerella* (Fln.) (From Hammer, 1941). (*b*) *Lyperosia irritans* (L.) (From Hammer, 1941). (*c*) *Musca domestica* L. (From Hewitt, 1914). (*d*) *Orthellia indica* (R.-D.) or *lauta* (Wied.) (From Thomson, 1947). (*e*) *Ophyra leucostoma* (Wied.) (From Keilin and Tate, 1930). (*f*) *Polietes albolineatus* (Fln.) (From Hammer, 1941). (*g*) and (*h*) *Morellia hortensia* (Wied.) (From Thomson, 1947), (*i*) *Hydrotaea tuberculata* Rond. (From Hammer, 1941). (*j*) and (*k*) *Passeromyia heterochaeta* Villen. (From Cuthbertson, 1939). (*l*) *Fannia scalaris* (F.) (Original). (*m*) and (*n*) *Synthesiomyia nudiseta* (Wulp.) (From Siddons and Roy, 1942). (*o*) *Dichaetomyia nubiana* (Big.) (From Cuthbertson, 1939). (*p*) *Muscina stabulans* (Fln.) (From Thomson, 1937). (*q*) *Phaonia variegata* (Meig.) (From Thomson, 1937). (*r*) *Atherigona quadripunctata* (Rossi)

in the use of the terms 'dorsal' and 'ventral' in connection with the flattened area. It appears, however, that the mouth-hooks of the young larva are always directed against the furrows which define the ribs, so that the flattened area would appear, morphologically, to be the ventral surface. In *MUSCINAE* and *ANTHOMYIINAE* the ribs do not project as flanges, these eggs representing obviously a primitive type from which the more or less flanged eggs of the other subfamilies can be derived. In these the pair of faint longitudinal ribs has been raised either over the whole length or only at the anterior end of the egg. The eggs have been studied by Muirhead Thomson (1937, *Parasitol.*, **XXIX**, pp. 273–358; 1947, *Proc. R. ent. Soc. London* (A), **XXII**, pp. 89–100), O. Hammer (1941, *Vid. Meddel. Dansk naturh. Foren.*, **CV**, pp. 104–131), M. Miles (1952–1953, *Bull. Ent. Res.*, **XLIII**, pp. 83–84, 591–592) and others.

The following types of eggs have been observed:—

1 (10) Egg with a pair of slight longitudinal ribs, which extend at least over about anterior fifth but as a rule over the full length (Fig. 8 *a–h*).

2 (3) Anterior end of egg truncate and with a thick rim round the micropylar area between the extremities of the ribs (Fig. 8*a*), hind end often bluntly pointed, ribs moderately broadly separated, sometimes (*Hylemyia cilicrura*) restricted to anterior fifth of egg .... *ANTHOMYIINAE*

3 (2) Anterior end of egg rounded or produced into a pedicel, ribs normally very narrowly separated, always practically complete.

4 (9) Ribs almost parallel on a great part of their length or even somewhat diverging from middle towards hind end (Fig. 8*b–f*).

5 (8) Anterior end of egg rounded without a pedicel.

6 (7) Ribs more conspicuous, the accompanying furrow being deeper, separated at middle by about one-sixth to one-third width of egg (Fig. 8*b*); if the ribs are separated

---

(From Venturi, 1940). (*s*) *Limnophora riparia* (Fln.) (From Keilin, 1917). (*t*) *Lispe metatarsalis* Thoms. (From Williams, 1937). (*u*) *Mydaea* (*Myiospila*) *meditabunda* (F.) (From Hammer, 1941). (*v*) *Xenosia* (*steini* Emd. ?) (From Thomson, 1947). (*w*) *Helina* (*Hebecnema*) *umbratica* (Meig.) (From Hammer, 1941). (*x*) *Scatophaga stercoraria* (L.) (From Thomson, 1938, modified).

		by less than a quarter width of egg, the latter brown. Up to 1·5 mm. long ...	*STOMOXYDINAE*
7	(6)	Ribs faint, the accompanying furrow being shallower, at middle separated as a rule by about a tenth or less width of egg, but sometimes (*e.g.* in *Musca domestica*) by about a third (Fig. 8*c–f*).	*PHAONIINI* pars: *Ophyra*; *MUSCINAE* (except *Morellia hortensia* and some subgenera of *Musca*)
8	(5)	Anterior end with a pedicel (Fig. 8*g*, *h*) ..	*MUSCINAE* pars: *Morellia hortensia*, *Musca* subgen. *Eumusca*, *Ptilolepis* and some *Viviparomusca*
9	(4)	Ribs evenly converging from front end towards their hind end, which lies towards middle or at any rate somewhat in front of posterior end of egg (Fig. 8*i*)	*PHAONIINI* pars: *Hydrotaea*
10	(1)	Egg with a pair of complete flanges or a pair of processes at anterior end (Fig. 8*j–x*).	
11	(14)	Flanges of almost even width, anterior and posterior ends similar (Fig. 8*j–r*).	
12	(13)	Flanges broad and expanded horizontally, egg including flanges not much more than twice as long as wide (Fig. 8*j*)	*FANNIINAE: Fannia*
13	(12)	Flanges more or less narrow and directed upward or downward, sometimes very narrow and more bead-like and thus transitional towards *Muscinae* (e.g. *Passeromyia*), egg three or more times as long as wide (Fig. 8*k–r*)	*COENOSIINAE*, *DICHAETOMYIINI*, *PHAONIINI*
14	(11)	Flanges markedly broadened anteriorly or developed only at anterior end as projecting horns (Fig. 8 *s–x*).	
15	(16)	Flanges developed on the whole length of the egg but somewhat broader and more or less projecting as rounded (LIMNOPHORINI) or frayed (*Lispinae*) lobes at front end, these lobes, however, not more projecting than the rounded anterior end of the egg (Fig. 8*s*, *t*).	*LIMNOPHORINI*, *LISPINAE*

16 (15) Flanges developed on anterior part only (Fig. 8*u–x*), or conspicuously projecting forward beyond the body of the egg (though not always beyond a median process where this is present).

17 (18) Flanges projecting forward beyond body of egg as pointed processes (Fig. 8*u–w*), becoming narrower, and sometimes fading out, posteriorly. Anterior end of egg between the flanges rounded (*Mydaea* pars) or produced into a pointed process (*Mydaea* pars, *Helina* sbg. *Hebecnema*) .. . . *MYDAEINI*

18 (17) Flanges not projecting forward beyond body of egg, confined to anterior part of egg and considerably broadened anteriorly into a pair of ear-like lobes (Fig. 8*x*) *CORDYLURIDAE: Scatophaga*

The eggs of only one or a few species of each group are known, some of the described eggs (*e.g.* the *Musca*-like egg of *Ophyra* and the pedicelled egg of *Morellia hortensia*) are unexpectedly different from closely related ones, and there are a few discrepancies between descriptions of the same species of egg by different authors. Therefore, much confirmation of the above egg types will be required before a truly reliable key can be produced. Nevertheless it appears better to arrange the available information in the above tentative key than in much less instructive descriptions.

(*b*) The Larva

There are normally three free larval stages and a hidden fourth inside the hardened skin of the third instar, which skin is known as the puparium. The first instar differs from the other two by the absence of the thoracic spiracles, a single (seldom double) opening in each of the posterior spiracles, and a simpler buccopharyngeal skeleton. In the second and third instars the anterior spiracles are present, and the posterior ones have two (seldom three) and three slits respectively. The available information on the first two instars is much scantier, and they are both short-lived. Moreover, in some species the first, or even the first and second, stage is passed inside the egg, so that the hatching larva is already a second or third instar. The following account is therefore confined to the third-stage larva.

The larvae are of the well-known maggot type with more

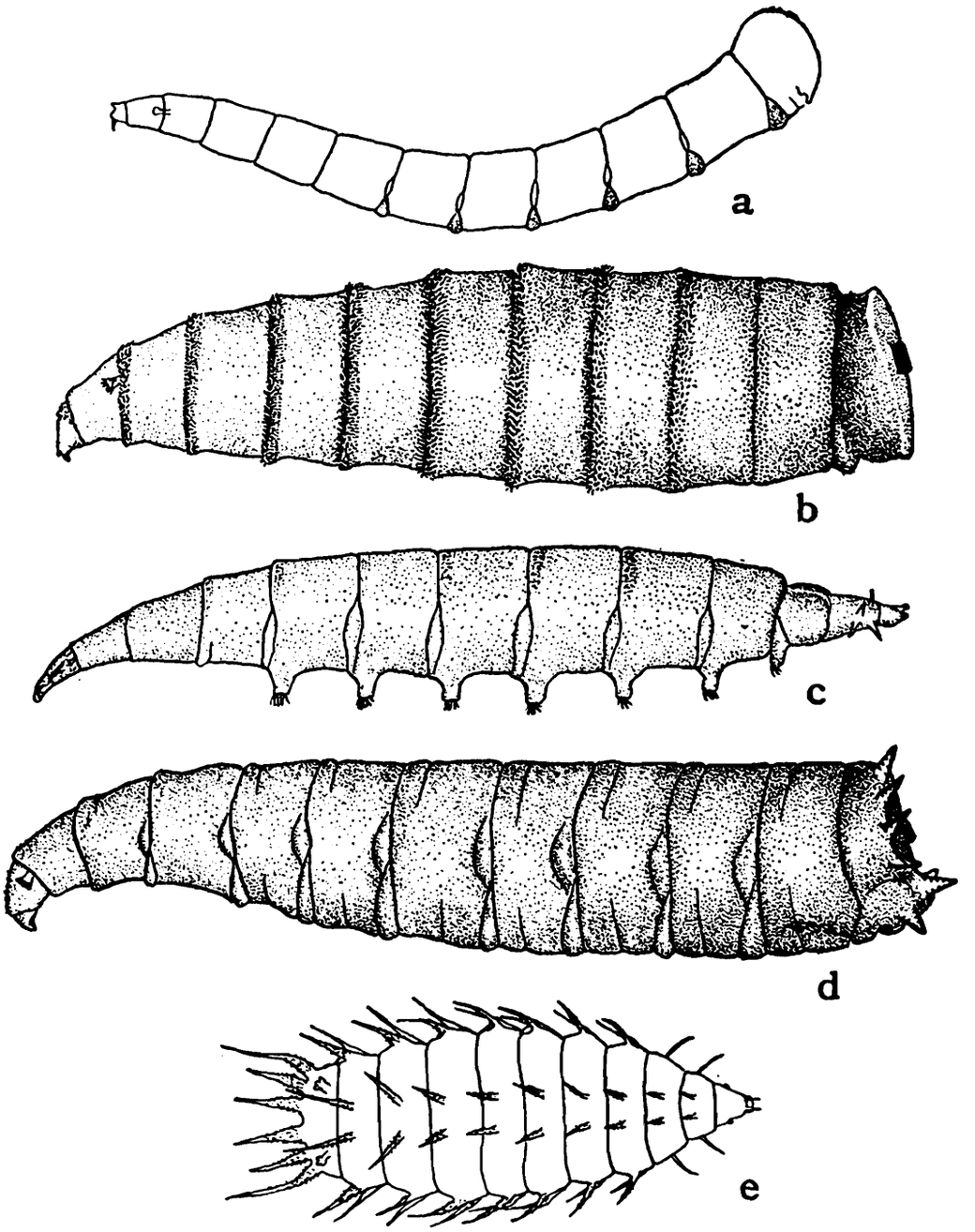


FIG. 9. Larval types of Muscidae. (*a*) *Polietes albolineatus* (Fln.). (*b*) *Morellia hortorum* (Fln.). (*c*) *Graphomyia maculata* (Scop.). (*d*) *Paregle radicum* (L.). (*e*) *Fannia canicularis* (L.). *a–d*, lateral view. *e*, dorsal view. All from Hennig (1952).

or less tapering front end and truncate to rounded hind end (Fig. 9*a*, *b*, *d*). Only in LIMNOPHORINI (*Graphomyia*, *Limnophora*, *Gymnodia*—but not *Anaclysta*) the hind end is more or less pointed (Fig. 9*c*) with the posterior spiracles lying at its tip. The mouth-hooks (Fig. 10) are of the Cyclorrhaphous type, *i.e.* movable parallel with one another and in a vertical plane, not against each other. The posterior spiracles (Fig. 11) are not or slightly prominent and not

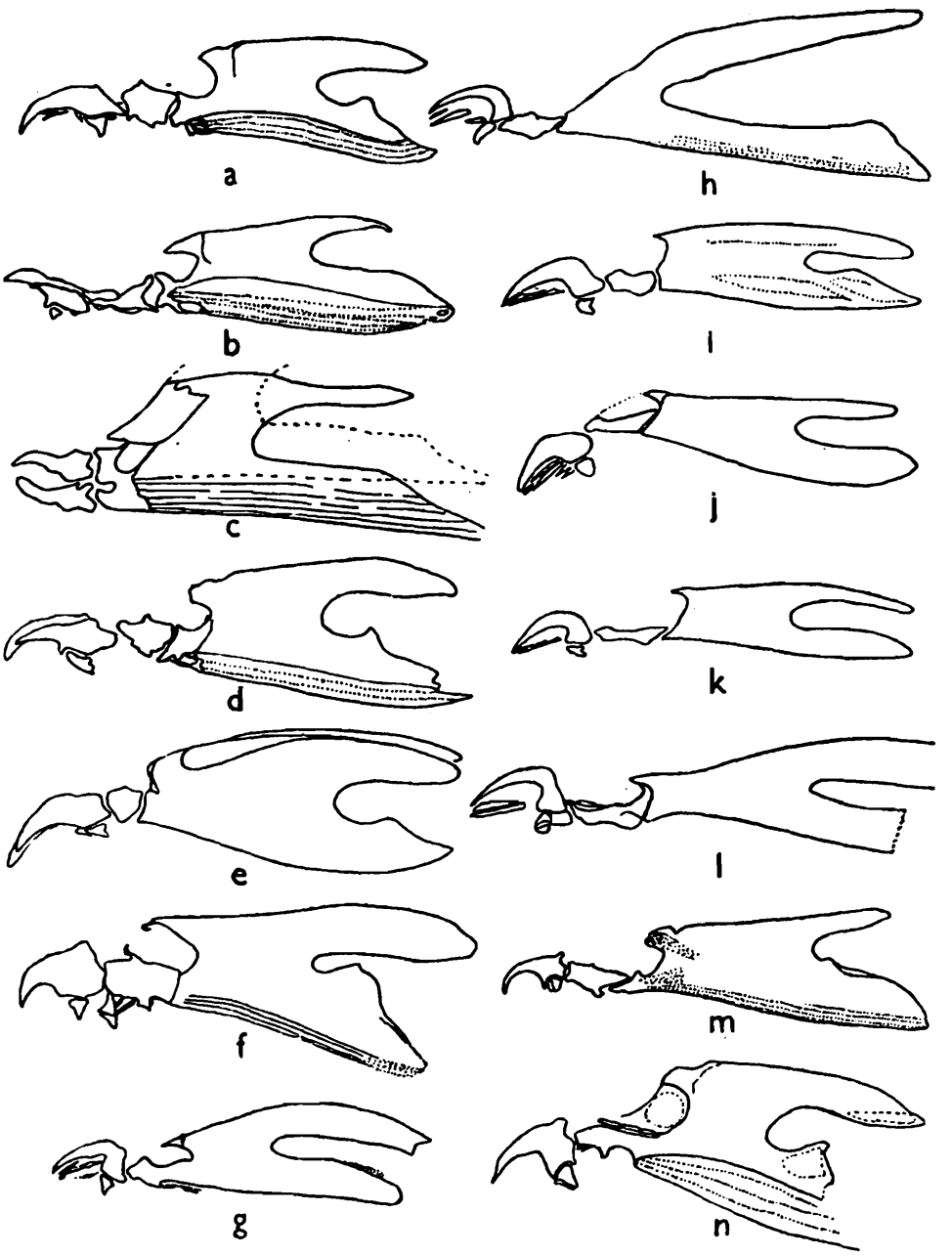


FIG. 10. Buccopharyngeal skeleton of larvae, lateral view: (*a*) *Orthellia caesarion* (Meig.) (From Zimin, 1948). (*b*) *Stomoxys calcitrans* (L.) (From Thomson, 1938). (*c*) *Stygeromyia maculosa* Aust. (From Cuthbertson, 1939). (*d*) *Musca domestica* L. (From Thomson, 1938). (*e*) *Musca bezii* P. and C. (From Thomson, 1947). (*f*) *Passeromyia heterochaeta* Villen. (Original). (*g*) *Mydaea* (*Myiospila*) *mediteabunda* (F.) (From Zimin, 1948). (*h*) *Dichaetomyia nubiana* (Big.) (Original). (*i*) *Xenosia* (*Steini* Emd. ?) (From Thomson, 1947). (*j*) *Helina* (*Hebecnema*) *umbratica* (Meig.) (From Thomson, 1937). (*k*) *Gymnodia distincta* (Stein) (From Thomson, 1947). (*l*) *Lispe loewi* Ringd. (Original). (*m*) *Fannia scalaris* (F.) (Original). (*n*) *Paregle cinerella* (Fln.) (From Zimin, 1948).

FIG. 11. Left posterior spiracle of third-stage larva. (In a few cases, viz. *q*, *t*, *x*, and *w*, the spiracle shown is actually the right one, but in order to facilitate comparison the drawing has been reversed. A line to the right of a spiracle indicates the outline of the nearest part of the right spiracle. Where this distance is known but is too great to be indicated in this way, a distance factor is given below. If this factor is multiplied with the over-all width of the spiracle, the distance between the nearest parts of the two spiracles will be obtained.) (*a*) *Musca bezzii* P. and C. (From Thomson, 1947). (*b*) *Musca crassirostris* Stein (From Thomson, 1947). (*c*) *Morellia hortensia* (Wied.) (From Thomson, 1947). (*d*) *Orthellia indica* (R.-D.) or *lauta* (Wied.) (From Thomson, 1947). (*e*) *Stomoxys calcitrans* (L.), distance 1·4 (From Thomson, 1938). (*f*) *Haematobia sanguisugens* Aust. (From Mitter, 1916).

united on a common sclerotized respiratory process. For the rest the distinctive characters of the CALYPTRATA and of the MUSCIDAE are not yet known. On the other hand, certain typical features of some of the subfamilies seem to emerge from the papers mentioned on p. 11 and Zimin's Key (1948, *Opred. Faune S.S.S.R.*, **XXVIII**). These features are compared in the following key, the tentative nature of which need hardly be stressed.

1 (8) Buccopharyngeal skeleton always without a parastomal sclerite (Fig. 10*a–m*). Eighth abdominal segment sometimes either with long paired plumose processes, in this case the other segments with similar processes (Fig. 9*e*), or with slight rounded protuberances round the spiracle-bearing area, in this case conspicuous accessory sclerites present below the mouth-hooks and the latter close together; but not with short conical processes.

2 (5) Middle (outer) slit of the posterior spiracles in an approximately vertical position (Fig. 11*a–j*), the slits being arranged roughly end to end in a semicircle and strongly meandering or broadly (Fig. 11*e–h*) S-shaped, seldom (*Stygeromyia*) almost straight. Cross-section of body subcircular, body without plumose or spinulose processes. Posterior spiracles rather large.

(*g*) *Haematobia sanguinolenta* Aust. (From Mitter, 1916). (*h*) *Lyperosia irritans* (L.) (From Zimin, 1948). (*i*) *Lyperosia titillans* Bez. (From Zimin, 1948). (*j*) *Stygeromyia maculosa* Aust. (Redrawn from Cuthbertson, 1939). (*k*) *Xenosia bina* (Wied.), distance 0·6 (Original). (*l*) *Passeromyia heterochaeta* Villen., distance 2·4 (Original). (*m*) *Phaonina corbetti* (Mall.), distance 1·2 (Original). (*n*) *Synthesiomyia nudiseta* (Wulp.) (From James, 1947). (*o*) *Dichaetomyia nubiana* (Big.), distance 4·4 (Original). (*p*) *Mydaea* (*Myiospila*) *meditabunda* (F.) (From Thomson, 1937). (*q*) *Helina* (*Hebecnema*) *umbratica* (Meig.) (From Thomson, 1937). (*r*) *Anaclysta flexa* (Wied.) (From Thomson, 1947). (*s*) *Gymnodia distincta* (Stein) (From Thomson, 1947). (*t*) *Allognota agromyzina* (Fln.) (From Keilin, 1917). (*u*) *Atherigona indica infuscata* Emd., distance 0·6 (Original). (*v*) *Lispe loewi* Ringd., distance 1·3 (Original). (*w*) *Fannia scalaris* (F.), distance 1·7 (Original). (*x*) *Paregle cinerella* (Fln.) (From Zimin, 1948). (*y*) *Synthesiomyia nudiseta* (Wulp.), hind end of larva (From Siddons and Roy, 1942). (*z*) *Paregle cinerella* (Fln.), hind end of larva. (From Zimin, 1948). (*zz*) *Scatophaga stercoraria* (L.), hind end of larva. (From Zimin, 1948).

3 (4) Slits of posterior spiracles strongly meandering (Fig. 11*a–d*) or broadly S-shaped, in the latter case conspicuous accessory sclerites (as in Fig. 10*i*) present below the mouth-hooks, and the latter equal .. *MUSCINAE*, p. 36

4 (3) Slits of posterior spiracles basically broadly S-shaped though often with secondary undulations or meanderings (Fig. 11*e–i*), seldom almost straight (Fig. 11*j*).* No accessory sclerites present below mouth-hooks; dental sclerites separate (Fig. 10*b*). Mouth-hooks unequal, the left one much shorter (except apparently in *Stygeromyia*, Fig. 10*c*). Anterior spiracles with about 4–7 buds *STOMOXYDINAE*, p. 150

5 (2) Middle (outer) slit of the posterior spiracles in a transverse or obliquely transverse position (Fig. 11*k–t*, *v*, *w*), the slits radiating from near the button or subparallel, never meandering or broadly S-shaped, but sometimes strongly curved or even (*Phaonina*, Fig. 11*m*) *deeply* S-shaped. Posterior spiracles smaller.

6 (7) At least abdominal segments 1–7 without long lateral and shorter dorsal plumose or spinulose processes (Fig. 9*c*). Accessory sclerites (Fig. 10*f–l*) present below mouth-hooks (except in *Passeromyia*). Dental sclerites fused with each other so as to form a ventral arch (except in *Passeromyia*, and *LISPINAE*?). *PHAONIINAE* (p. 180), *COENOSIINAE*, *LISPINAE*

7 (6) All abdominal segments with long lateral plumose or spinulose processes (Fig. 9*e*), segments 1–7 also with shorter dorsal ones, meso- and metathorax with similar processes. No accessory sclerites present below mouth-hooks. Dental sclerites separate (Fig. 10*m*). Body somewhat flattened .. .. *FANNIINAE*

8 (1) Buccopharyngeal skeleton with a parastomal sclerite (Fig. 10*n*; in

* The slits of the posterior spiracles are also arranged end to end in *Atherigona* (Fig. 11*u*), but in that genus the accessory oral sclerites will probably be present and the dental sclerites fused into a ventral arch.

many figures this is not shown and may have been overlooked, or it may not always be present). Eighth abdominal segment with a crown of fleshy tubercles surrounding the disc on which the spiracles are situated (Fig. 11*z*, *zz*). No accessory sclerites present below mouth-hooks; dental sclerites separated (Fig. 10*n*); mouth-hooks rather widely separated and movable independently. Slits of hind spiracles radiating, more or less straight.

9 (10) Eighth abdominal segment and its fleshy processes bare or practically bare (Fig. 11*z*) ... . *ANTHOMYIINAE*

10 (9) Eighth abdominal segment including the fleshy processes densely covered with fine short dark hair (Fig. 11*zz*) CORDYLURIDAE

(*c*) The Pupa

The full-grown larvae transform inside the hardened third larval skin into a soft-skinned whitish pupa, which has been described and figured for only a few species, so that taxonomic conclusions cannot be drawn. However, it is improbable that these pupae will show any specific pupal characters as opposed to the adult features visible in the pupa.

On the other hand a fair amount of literature and material is available on the puparia, the hardened and more or less barrel-shaped third larval skins. Their characters are, of course, those of the last free larval stage, only slightly modified by the change to barrel shape and the sclerotization. Therefore, the classification of the puparia is found in the preceding key, which is in fact based on puparia in cases where no typical third-stage larvae were available.

Biology

By and large the MUSCIDAE are closely associated with decaying organic matter, especially dung, but many groups have acquired special habits, which may be widely different.

The adults of all *MUSCINAE*, *Scatophaga*, *Dichaetomyia*, *Muscina*, *Mydaea*, *Hebecnema*, *Euspilaria* and *Graphomyia*, are much attracted to dung, especially more or less fresh droppings, but also to other decaying organic matter; some species of *Musca* also lick sores of cattle and humans. *M. conducens* and others are found on cattle feeding on the blood oozing from the bites of other insects, some species, quite especially *M. crassirostris*, using their prestomal teeth for

scratching the sore skin, so that the blood flows more freely. *Hebecnema* and *Hydrotaea* have been found to act similarly. *Musca autumnalis* and species of *Hydrotaea* and *Pogonomyia* are persistent in sultry weather in licking up the sweat (at least in temperate regions) and are very troublesome by this habit. The *STOMOXYDINAE* pierce the skin with their specially adapted proboscis to suck blood, *Stygeromyia* at dusk, the others in daytime, *Lyperosia* staying on its animal host practically all the time. *Haematobia* and *Lyperosia* are essentially found in the open and seldom attack man, all members of the group being especially attracted by cattle.

Many of the *MUSCINAE* and *PHAONIINAE* are frequently found on flowers, leaves, etc., and forms like *Synthesiomyia*, *Muscina*, *Dichaetomyia* and *Helina uliginosa* often enter houses, the last species sometimes sheltering in houses in India during daytime in enormous numbers. *Synthesiomyia*, which is much attracted to putrid meat, *Dichaetomyia*-species, *MUSCINAE*, etc., which visit filth, are of hygienic concern when found in houses as potential transmitters of germs.

Species of the genera *Ophyra*, *Hydrotaea*, *Azelia* and *Fannia* are often conspicuous (at least in temperate climates) by their dancing swarms, a number of males flying about in certain regular figures in a small sheltered space under a tree or near some other taller object. Flies of the family CORDYLURIDAE and the Muscid subfamilies *COENOSIINAE* and *LISPINAE* are predators as are some *PHAONIINAE* (especially some *Helina* and LIMNOPHORINI). Their prey consists mainly of other Diptera, especially Nematocera, and the *LISPINAE*, which are found on vegetation on or at the edge of water, feed especially on larvae, pupae and adults of mosquitoes. In consequence of their numbers and active habits they are believed to be able to reduce the populations of their victims substantially.

Although none of the Oriental forms produce full-grown larvae which pupate immediately, as is the case in the Tsetse flies and the Pupipara, several species of *Musca* and apparently some *Dichaetomyia* occasionally deposit larvae which have already reached their final instar. Nevertheless, these larvae still have to do most of the feeding and growing of their larval life. In some species of the genera *Mesembrina* and *Dichaetomyia* it has been found that the eggs hatched at the moment of being deposited or very shortly after. It is perhaps more probable that there is some latitude in the time the eggs are retained by the female than that some species or genera should be regularly ovoviviparous. The

majority of the genera and species at any rate deposit eggs, from which the larva hatches after an incubation of one or more days.

Normally the eggs are found on, or somewhat below, the surface of the decaying matter in which the larvae develop, but at least some species of *Polietes* deposit the eggs on the ground just by the side or below the dung. *Scatophaga* pushes the eggs into the dung, so that only their anterior part with the flanges remains exposed, and much the same applies to the other forms with projecting flanges. These eggs are laid singly, the female crawling about for a short distance after having laid an egg. Eggs without flanges are either introduced into the upper layer of the dung (e.g. *Musca*, *Orthellia*, *Mesembrina*, *Hydrotaea*, *Azelia*, *Paregle*, etc.), or laid on the surface (*STOMOXYDINAE*). These eggs without flanges are often deposited by a female in small groups, and in *Hydrotaea* sometimes intentionally or by accident on the larger eggs of *Orthellia* (for details of egg-laying habits *see* Hammer, 1941, *Meddel. Dansk nat. hist. For.*, CV, pp. 104 – 131). In *ANTHOMYIINAE* with phytophagous larvae the eggs are laid, as a rule in small groups, on the foodplant or on or in the soil close by.

In most cases the hatching larva is a first instar, but there are not a few exceptions, the first instar being 'suppressed', *i.e.* spent in the egg before hatching. This is the case in some *Dichaetomyia*, *Mydaea* (including sbg. *Myiospila*), *Hebecnema*, *Xenosia*, *Anaclysta*, *Gymnodia*; and in some *Mydaea*, *Phaonia* and *Limnophora* not only the first but the second larval stage also is spent in the egg, the hatching larva being an early third instar.

Most Muscid larvae are found in decaying matter, especially dung, and the largest number of individuals but the minority of species are coprophagous or saprophagous throughout their life, e.g. *Musca*, *Morellia*, *Orthellia*, *Dasyphora*, *Fannia*, *Scatophaga*, *Azelia*, *Paregle*, *Hylemia* (s. str.) and all *STOMOXYDINAE*. The observations on *Mesembrina* and *Polietes* are somewhat contradictory. The larval mouthparts have the features usually found in carnivorous species, and it is certain that their third instar can attack and devour other Diptera larvae, but Hammer's breeding experiments indicate that they are essentially coprophagous. In *Muscina* also the last instar is able to live as a predator and even a parasite of insects and other animals, sometimes causing cutaneous or intestinal myiasis in Vertebrates including man. Many species and genera are saprophagous, especially coprophagous, in the first two or, where the first is suppressed, in the second

stage only, whereas the third is obligately predacious. This is known to be the case in *Anaclysta*, probably *Gymnodia*, *Hydrotaea*, *Myiospila*, *Mydaea*, *Hebecnema*, some *Phaonia*, probably *Xenosia*. The larvae of the following genera are known to be predators, but it is unknown if the first instar has the same habits : *Spilogona*, *Limnophora*, *Graphomyia* (all three being aquatic), *Pogonomyia* (in humus), *Ophyra* (in dung, carrion, birds' nests), *Dichaetomyia*(?), *Helina* (some in decaying vegetable matter, *e.g.* wood), *Acritochaeta* (in decaying vegetable matter but also dung). *Ophyra* and *Hydrotaea* are known to be especially effective enemies of larval Diptera, e.g. *Eristalis*, *Fannia*, *Musca* and *Stomoxys*, the numbers of which they reduce materially. *Synthesiomyia* develops in carrion but also other decaying organic matter both animal and vegetable, it has been recorded to infect wounds secondarily in cases of myiasis. *Passeromyia*, the eggs of which are already deposited there, completes its metamorphosis in birds' nests, feeding on the nestlings as an intermittent parasite.

Although the damages by phytophagous *ANTHOMYIINAE* are conspicuous in Europe and North America, not many MUSCIDAE feed on living plant tissue in the Oriental region. Apart from the species of *Atherigona* s. str., which develop in various grasses, and a few *ANTHOMYIINAE* the genus *Phaonina* (*see* p. 201) and possibly the subgenus *Eumyiospila* (*see* p. 488) are in this category.

The full-grown larva ceases feeding and crawls about in search for a place for pupation. This is usually a cavity or niche in the medium in which they have grown up, in most cases, therefore, in dung. However, some forms as a rule pupate in the soil nearby, especially *Muscina*, *Ophyra*, *Mydaea* and *Myiospila* and sometimes *Hydrotaea*. Before pupating the larvae of a few genera of *PHAONIINAE* construct a cocoon from debris and a secretion. This has been observed in *Synthesiomyia*, *Passeromyia*, *Muscina*, *Xenosia*, *Myiospila* and some *Helina* (s. str.) and *Gymnodia*. The larva then contracts and assumes a barrel shape. The mouthparts and head are completely withdrawn and remain connected with the scar indicating the position of the head by a short membraneous tube. The skin of the third instar hardens to form a ' puparium ' and becomes as a rule more or less rufous-brown but only dull creamy in some species of *Musca*. Inside by another moult the very thin cuticle of the fourth instar is shed and the pupa formed. The hatching adult opens the puparium by the pressure of the extended ptilinum, which is also used by the still soft adult for forcing a way

through the soil or dung which separates it from the open air. This process is not one of digging but comparable to the methods used by a worm which forces its front end forward by alternating contractions and dilations. After reaching the open air, the adult rests for some time, during which the legs assume their final shape, the wings are stretched, and the normal colouration gradually assumed.

The puparium is opened in a circular suture round the anterior part of the fourth segment (first abdominal segment) and a longitudinal suture along lateral and anterior surfaces at right angles with the circular suture, so that a dorsal and ventral flap can be raised to allow the adult to leave.

Classification

Schiner (1862, *Fauna Austriaca, Die Fliegen*, I, p. LXX) divided the Calyptrata into two main groups on the presence or absence of an apical cross-vein, including in the former such genera as *Myiospila* and *Muscina* and in the latter his *ANTHOMYIINAE*, *Mydaea*, *Anthomyia*, etc. The former group contained what we now call TACHINIDAE and CALLIPHORIDAE in the wider sense in addition to the *MUSCINAE*. Girschner and others removed the two families with hypopleural bristles from the MUSCIDAE, but the primary division by the apical cross-vein is still used in some modern works, *e.g.* Karl's MUSCIDAE (1928, in *Dahl, Tierwelt Deutschl.*, pt. 13). Ringdahl (1929, *Ent. Tidskr.*, **L**, pp. 8–13) divided the family into *ANTHOMYIINAE* (sixth vein reaching wing margin) and *MUSCINAE*, thus avoiding the unnatural separation by the bend of *m* but on the other hand giving to the subfamily *MUSCINAE* a scope which renders it altogether too unmanageable, if a wider faunal area is treated. Malloch in various papers (especially 1934, *Dipt. Patag. S. Chile*, **VII**, pp. 176–177) produced a classification which incorporated the advantages of both Karl's and Ringdahl's systems, and which was more or less closely followed by most later authors (*e.g.* Séguy, 1937, *Gen. Ins.*, pt. 205, pp. 33–36 and van Emden, 1941, *Bull. ent. Res.*, **XXXII**, pp. 252–253). In these classifications the *MUSCINAE* are separated from the *PHAONIINAE*, etc., by the formation of the lower calyptra. Malloch himself had at least at one time (1929, *Ins. Samoa VI, Diptera*, p. 174) qualified this character so as to include forms with a Phaoniine calyptra but a setulose pteropleura (and a few others) in his *MUSCINAE*. Taking account of the early stages, Collin (1948, *Proc. R. ent. Soc. Lond.* (B), **XVII**, pp.

125–127) suggested that the subfamily *MUSCINAE* should be based, as far as the Palaearctic fauna is concerned, mainly on the setulose pteropleura, so as to include *Polietes* (with flangeless eggs and meandering or S-shaped slits of the posterior spiracles in the third larval instar) and to eliminate *Graphomyia*. Hennig (1952, *Larvenformen der Dipteren*, **III**, pp. 359–400) classified the larvae in a similar way without, of course, elaborating the corresponding characters of the adults. In Lindner (1955, *Fliegen der palaearkt. Reg.*, pt. 63*b*) he separated the *ANTHOMYIINAE* with complete sixth vein as a family ANTHOMYIIDAE from all the remaining subfamilies, which he united in the MUSCIDAE. This is the logical course if the MUSCIDAE in the wider sense are considered to be biphyletic, but this can hardly be considered to have been proved.

There is little controversy about the scope of the *ANTHOMYIINAE*, *FANNIINAE*, *LISPINAE*, *COENOSIINAE* and *STOMOXYDINAE*, and these subfamilies can be fairly easily defined so as to bring a few atypical genera like *Xenotachina*, *Eginia*, *Chelisia*, *Pseudocoenosia*, etc., into them. The main difficulty is the definition of the *MUSCINAE* and *PHAONIINAE* from each other. Hennig in an interesting new classification (1956, in Lindner, *Flieg. palaearkt. Reg.*, 63*b*, p. 101) divides the family except *ANTHOMYIINAE* and *FANNIINAE* into *MUSCINAE* (with a *pd* seta on the hind tibia) and *MYDAEINAE* (without this seta), the former subfamily containing *MUSCINAE*, *STOMOXYDINAE* and *PHAONIINAE* of the present volume, the *MYDAEINAE* 'AZELIINI', LISPINI, COENOSIINI, LIMNOPHORINI and MYDAEINI. Apart from the fact that the separation according to the presence or absence of the *pd* seta must create many practical difficulties (*e.g.* in *Ophyra* and *Hydrotaea* which contain species with and without this seta, *Rhynchomydaea*, *Dichaetomyia*, etc.) and that it removes *Azelia* from the PHAONIINI, the latter can hardly be considered markedly more closely related to the *MUSCINAE* than to the MYDAEINI, and these hardly less closely related to the *MUSCINAE* than are the PHAONIINI.

There are three main groups to be considered, those round *Musca* with a setulose pteropleura and a broad lower calyptra, simple eggs, and meandering slits of the posterior larval spiracles, those round *Phaonia* with bare pteropleura, a narrowed lower calyptra, flanged eggs, and straight radiating spiracular slits, and those round *Graphomyia*—and in the ORIENTAL REGION this group contains more genera than the

first one, but not many species—in which the pteropleura is bare, the lower calyptra broad, the eggs flanged, and the slits of the posterior larval spiracles deeply S-shaped (much more so than in *Polietes hirticrus*), curved or straight. In addition there are such genera as *Polietes* (pteropleura setulose, calyptra narrowed, eggs simple, spiracular slits meandering or S-shaped), *Dichaetomyia* (pteropleura setulose, calyptra narrowed, eggs flanged, spiracular slits straight and radiating), *Ophyra* and *Hydrotaea* (pteropleura bare, calyptra narrowed, eggs simple, spiracular slits straight and radiating). It is clear, then, that the *Musca* group is connected with the *Phaonia* group by a complete series of transitions, and, in fact, transitions to several tribes of the *PHAONIINAE*. Any division will, therefore, have to be somewhat arbitrary. It would certainly be undesirable to bring *Dichaetomyia* or *Hydrotaea* and *Ophyra* into *MUSCINAE*. Although the straight *m* of *Polietes* is a strange element in this subfamily, the simple egg, meandering or S-shaped hind spiracles of the full-grown larva, and setulose pteropleura seem to indicate relationship to the *Musca* group, as Collin has pointed out. Nevertheless certain features of the mouthparts are unusual in the group and only found in *Mesembrina*. Collin suggested that *Graphomyia* should form a subfamily of its own. Applied to the Oriental fauna, this would probably mean that *Synthesiomyia* and the other genera with large calyptra and bare pteropleura would have to be placed in the same group. However, this would be composed of decidedly intermediate forms, and I prefer to include intermediate genera in one of the main groups rather than to create a separate co-ordinated aggregate for them. Therefore, the group in question will have to be amalgamated with the *PHAONIINAE*, although this is already a huge subfamily. The question then arises whether the group is to form a separate tribe of *PHAONIINAE* or whether it is to be distributed over the existing ones. If the latter is done, *Xenosia* will fall in MYDAEINI next to *Xenosina*, *Graphomyia* and *Anaclysta* in LIMNOPHORINI where the latter genus will be close to *Gymnodia*, in which the species have formerly been placed and with which they share the fringe of setulae on the ventrobasal scale, and the remaining genera in PHAONIINI. The general appearance and especially the shape of the head of the adults support this arrangement. Moreover, the three genera with more or less straight spiracular slits of the larva would then be together in MYDAEINI and LIMNOPHORINI, and the genus in which the flanges of the egg project as pointed processes, *Xenosia*, would be in MYDAEINI

where this is the case regularly. The genera in which the flanges of the egg are of even width and do not project at the end will by this character fit into the PHAONIINI, and the egg of *Anaclysta* is very similar to that of *Gymnodia*, the flanges being slightly broadened anteriorly where they project somewhat as slight rounded lobes. The striking larva of *Graphomyia* with its pointed spiracle-bearing process of the last segment, then, loses its isolated position and lines up naturally with *Limnophora* (van Emden, 1957, *Proc. R. ent. Soc.* (C), **XXI**, p. 45). As Herting (1957, *Z. Morph. Ökol. Tiere*, **XLV**, p. 438) has shown, the features of the female postabdomen suggest the same position. It therefore appears that if the group with large calyptra and bare pteropleura is removed from the *MUSCINAE* it is best dissolved and distributed over the tribes of the *PHAONIINAE*.

Phylogeny

The higher Diptera have usually been arranged in the order Brachycera Orthorrhapha (ending with EMPIDIDAE and DOLICHOPODIDAE)—Aschiza—Acalyptrata—Calyptrata, and terms like Myiodaria inferiora (Bezzi) for the Acalyptrates, Myiodaria media for the MUSCIDAE, and Myiodaria superiora for the CALLIPHORIDAE and TACHINIDAE express clearly the underlying idea. However, this phylogenetic concept would imply that forms with a forked *m* like *Microphthalma*, *Linnaemyia*, *Voria*, *Sarcophaga*, etc., and forms with an elbowed *m* like *Musca* must have developed from ancestors with a simple and straight *m* like *Hylemyia*, *Drosophila*, etc., although these are derived themselves from distant ancestors with a forked median vein. The main evolutional trend in Diptera is one of reduction towards a secondary simplicity, and the arrangement Nematocera, Brachycera Orthorrhapha, Aschiza, Calyptrata, Acalyptrata is therefore much more logical than the above sequence. In Calyptrata and the more primitive families *sc* is complete and reaches *c* separately. The same applies to some Acalyptrata, but the tendency in this group is towards a reduction of *sc* or an amalgamation with r_1, surely a development which can only be explained as a highly derived condition. Although in some Acalyptrata the anal cell is larger than in Calyptrata a similar evolutionary process affects the anal area of the wing, so that in all these wing characters evolution can have proceeded from the more primitive Brachycera either by way of the Calyptrata to the Acalyptrata or independently to the Calyptrata and Acalyptrata but certainly not by way of the Acalyptrata to

the Calyptrata. The fork of *m* lies proximad of *m-m* in the primitive Brachycera but is shifted distad in EMPIDIDAE-DOLICHOPODIDAE, Aschiza and Calyptrata, so that the origin of the latter can only be found in the Empidiformia or Aschiza and their ancestors.

In the more primitive Brachycera the male is holoptic * as in most Aschiza and Calyptrata. Even though the enlarged eyes of the male may not be a primitive feature of the Diptera as an Order, they certainly are this for the Brachycera. In this regard, too, the Calyptrata as a whole appear more primitive than the Acalyptrata, which are largely dichoptic. The large thoracic (lower) calyptra, which has given the Calyptrata their name, is found in TABANIDAE, many STRATIOMYIIDAE, ACROCERIDAE, SYRPHIDAE, most, but not all, 'Calyptrata', and a few 'Acalyptrata'. It may indicate some relationship with primitive Brachycera and with Aschiza, but it is perhaps more probable that groups with largely squat forms tend to have a large lower calyptra. The hairing and setae are more evenly distributed in Calyptrata and show strong tendencies of reduction in the Acalyptrates, and the latter applies to the exterior male genitalia. On the other hand the position of the spiracles in the Calyptrata shows undoubtedly the derived condition. According to Frey (1921, *Acta. Soc. Fn. Fl. Fenn.*, **XLVIII**, p. 3) the mouthparts are in almost every regard more primitive in Acalyptrata than in Calyptrata, but Frey did not compare them with those of the Aschiza and Brachycera Orthorrhapha, and from the figures in Peterson's (1916, *Illin. biol. Monogr.*, **III**, p. 2) and Bletchly's (1954, *Proc. Zool. Soc. Lond.*, **CXXIV**, p. 317) papers it would appear that in several of the important characters these groups are closer to the Calyptrata than to the Acalyptrata.

However this problem may be solved finally, it appears impossible to derive the *MUSCINAE* from the lower Diptera by way of the *PHAONIINAE*, and the fact that the transitional genera between *MUSCINAE* and *PHAONIINAE* show strong relationship to the *different* tribes of the latter agrees with this view. For, if evolution had proceeded from *PHAONIINAE* to *MUSCINAE*, the latter would then have to be regarded as polyphyletic, whereas characters like the large lower calyptra of the adult and the curved spiracular slits of

---

* The term 'holoptic' is used here in the sense of a head (or insect) with substantially enlarged eyes and reduced frons, and in this sense even *Xylophagus* is holoptic in the male sex.

the larva can easily have been preserved in several tribes derived from Muscinae-like ancestors. The *COENOSIINAE* and *LISPINAE* are so closely related to the *PHAONIINAE* that if the above views are correct, they must have evolved from them.

All the four subfamilies mentioned so far have only five pairs of abdominal spiracles in the female sex (Herting, 1955, *Mitt. Schweiz. ent. Ges.*, **XXVIII**, p. 220; 1957, *Z. Morph. Ökol. Tiere*, **XLV**, p. 429; Vockeroth, *unpublished*) but seven in the male, whereas the *ANTHOMYIINAE* and *FANNIINAE* have seven in both sexes. The complete sixth vein and the simple egg are primitive features of the *ANTHOMYIINAE*, the former not occurring in *MUSCINAE*. It is possible, therefore, that the family is biphyletic and that the *ANTHOMYIINAE* have arisen from a different stock. On the other hand, there are so many common features, that this is certainly not proved and not too probable. Moreover, the CORDYLURIDAE seem to show affinities both to *ANTHOMYIINAE* and to *COENOSIINAE*, and this contradicts a separate origin of that subfamily. The primitive characters will then have to be considered as due to a relatively early separation or, possibly, in part as atavisms. As to the number of abdominal spiracles of the female, this is of course a caenogenetic feature of the subfamily group *MUSCINAE*, *PHAONIINAE* and *COENOSIINAE*, and the fact that it applies only to one sex, marks it as an acquired character, to which too much phylogenetic importance should perhaps not be attributed.

Apart from the number of spiracles of the female abdomen and the peculiar larvae, the *FANNIINAE* are very closely connected with the *PHAONIINAE* by such genera as *Azelia*, *Hydrotaea* and *Ophyra*, and the egg type is that of the *PHAONIINAE* (although *Hydrotaea* and *Ophyra* are atypical in this regard). In my experience processes of the abdominal segments like those which give the *Fannia* larva its distinctive appearance are of little phylogenetic significance. The separate dental sclerites and the absence of accessory sclerites from the buccopharyngeal skeleton, however, indicate clearly (as do several characters of the adult) that this group must have separated early from the Phaoniine stem, and that its rank as a subfamily is well justified, obviously more so than that of *COENOSIINAE* and *LISPINAE*.

Explanations concerning the systematic part

Surnames in ( ) if printed in Roman type refer to authors of publications, if printed in Italics, to collectors.

Genera and species placed in [ ] are mentioned for comparison only but have not been found within the faunal limits. ! indicates that I have seen the type.

Oriental specimens of species occurring in the Temperate regions tend to be smaller (*see* for instance the genus *Fannia*), and the hotter climate also favours a reduction of the frontal width (*e.g.* in the forms of *Musca domestica*, *Fannia manicata*, *Mydaea meditabunda*). Some special reference should perhaps be made to the large number of species described below from Kambaiti in N.E. Burma. Malaise (1945, *Opusc. ent. Suppl.*, IV, pp. 71–72) writes about this locality: '2 km. above the village of Kambaiti at almost exactly 2,000 m. (7,000 ft.), along the mule-track to China, the valley was narrowed and comparatively free from vegetation along the road and the torrent close by. A rather high percentage of the insects flying up or down the valley passed that clearing a marked concentration of insects was noticeable on a stretch of less than 200 m. along the road. Here the author caught about 90% of the insects from Kambaiti and about ten times more specimens than in all other places in Burma together. By and by all the insect traps were moved to this part.' The present volume will show that a fair number of the species is found in far distant localities and countries, so that the wealth of species caught at Kambaiti is probably not so much due to a truly alarming number of endemisms but rather to especially intensive collecting and abnormally favourable collecting conditions during Dr. Malaise's stay at the locality as compared with the efforts devoted to other parts of the Indian subregion.

As the MUSCIDAE of the world and their literature have been catalogued by Séguy (1937, *Gen. Ins.*, pt. 205, Muscidae) synonymy and references have been given sparingly in the present volume and are restricted essentially to the original descriptions; references additional to those listed by Séguy, and synonymy and references affecting the Oriental region are summarized in this volume.

Unquestionably it would have been desirable to make much greater use of the male genitalia in the descriptions, but the fact that the completion of this work will have taken fully twenty years by the time the remaining subfamilies have been dealt with, will show that the task would have become unmanageable in addition to my other duties. The alternatives would have been, therefore, a restriction of the work to a few subfamilies, or a much less intensive study of the external characters. The association of females and undissected males with the restricted number of males of which

the genitalia can be studied will always be based on external characters. Therefore, it appeared better from a practical point of view to lay the emphasis on a classification by the latter, and to leave a wider use of genitalic characters to future more intensive work on single groups and genera. A restriction to only some of the subfamilies was never contemplated for the simple reason that the magnitude of the task was not realized until draft keys and notes to all subfamilies were completed and the working out of the descriptions taken in hand. Even then it appeared to me that the usefulness of the volume could be increased more by including the large Burma and Ceylon collections than by dissecting and figuring the genitalia of the much smaller number of species available without Dr. Malaise's and Dr. Keiser's material.

Definition of MUSCIDAE *and* CORDYLURIDAE

Key to the Families of CALYPTRATA

1	(6)	Hypopleura in front of spiracles with a curved—concavity forward —row of setae. If *m* is continued to margin without being markedly curved forward, the scutellum with diverging subapicals which are much stronger than the apicals.	
2	(5)	Postscutellum (a convex cushion-like fold without hairs and setae below the scutellum and above the metathoracic declivity) well developed.	
3	(4)	Mouthparts vestigial, mouth small	OESTRIDAE *
4	(3)	Mouthparts functional, well developed	TACHINIDAE
5	(2)	Postscutellum indistinct or weakly developed	CALLIPHORIDAE †
6	(1)	Hypopleura in front of spiracles without a row of strong bristles though sometimes with more or less conspicuous irregularly arranged setulae; if these form a distinct row (in *Eginia* and some *Xenotachina*) *m* not upcurved and reaching margin, and margin of	

* Treated by Brunetti in *Fn. Brit. India, Diptera*, Vol. III, 1923. By many authors the OESTRIDAE are not now regarded as a family, but as they have been worked out already in Vol. III, they are keyed out separately.

† Treated by Senior White, Aubertin and Smart in *Fn. Brit. India, Diptera*, Vol. VI, 1940.

scutellum with strong decussate apicals and without (or with very weak) subapicals.

7 (8) Lower calyptra more or less conspicuous, sometimes, however, much less projecting than upper one; in these cases either hind tibia with a distinct pair of *d* rows of decumbent black hairs, which lie on two slight longitudinal ridges, or occiput with black hair.... .. .. MUSCIDAE, p. 33

8 (7) Lower calyptra strongly reduced, not projecting and forming only a membraneous fold. Hairs irregularly arranged on the evenly convex dorsal surface of the hind tibia. Occiput with more or less numerous whitish hairs. Head always with broad frons and without cruciate interfrontal setae. Abdomen almost always with 5(6) exposed segments. Sixth vein (in Oriental species always) reaching wing margin.. .. CORDYLURIDAE *

Key to the Subfamilies of MUSCIDAE

1 (12) Sixth vein very rarely reaching margin of wing, in this case (some *Xenotachina* and related genera) hypopleura with very conspicuous black setae or setulae which may form something like the row of the CALLIPHORIDAE, and scutellum entirely bare beneath. If the under side of the scutellum bears fine erect pale hairs, sixth vein never closely approaching wing margin.

2 (5) Pteropleura setulose on upper embossed part (Fig. 4), *and either* the *stpl* not arranged in a pronounced triangle (but rather in a shallow curve, the angle at the lower *stpl* being about 140°, Fig. 4) or *stpl* reduced to 0+1 or 1+1 *or* the inner margin of the lower calyptra closely adjacent to margin of scutellum, converging posteriorly with longitudinal axis of body, and suddenly turning outward into the apical margin, which is more or less broadly truncate, *i.e.* of *Musca* type (Fig. 4), *m* as a rule strongly upcurved (not upcurved only in *Polietes*); sixth vein not reaching

* To be treated in the later volume containing the remaining subfamilies of the MUSCIDAE.

margin (Pl. 1, figs. 1–4, 6–10). (♀: Abdominal spiracles 6 and 7 absent).

3 (4) Proboscis of the licking type, rather short and stout, mentum shorter than head and only moderately tapering, labella well developed (Fig. 4). Usually 1+2 *stpl.* Arista long-plumose (Figs. 12, 13) .. *MUSCINAE*, p. 36

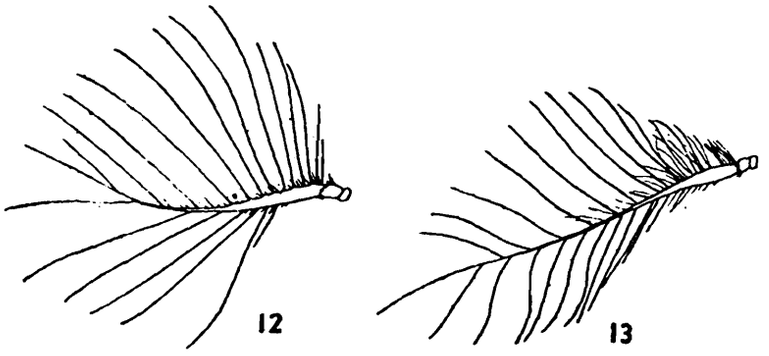


FIG. 12. *Musca bezzii* P. and C., arista.
FIG. 13. *Morellia nigrisquama* Mall., arista.

4 (3) Proboscis of the blood-sucking type (Figs. 33, 35), strongly sclerotized, mentum at least as long as head, slender, strongly tapering to apex, without distinct labella (but usually with conspicuous prestomal teeth). *m* conspicuously upcurved at apex (Pl. 1, figs. 6–10). Lower calyptra rather broadly rounded at apex. Never more than 1+1 *stpl.* Arista pectinate (Figs. 33, 35) or with a few rays also on under side (Fig. 42). (♀: Abdominal spiracles 6 and 7 absent) *STOMOXYDINAE*, p. 150

5 (2) Pteropleura bare on upper embossed part or setulose; in this case the *stpl* arranged in a pronounced triangle, the angle at the lower *stpl* not much exceeding 110°, and inner margin of the lower calyptra diverging from margin of scutellum and longitudinal axis of body (Fig. 3), apex strongly rounded, and calyptra therefore more or less subtriangular (*i.e.* of *Phaonia* type).

6 (11) Hind tibia often with *pd* or *ad* setae or both, but never with a strictly *d* seta in exact alignment with the *d* pre-apical. *sc* with a distinct though sometimes very slight forward bend between the part which

lies farthest from c and tip (Pl. 2, figs. 11–14, 16–19); sixth and seventh veins diverging or slightly converging towards wing margin, but never by an imagined further extension meeting before reaching the margin (except in *Azelia*). (♀: Abdominal spiracles 6 and 7 absent).

7 (10) Pteropleura either entirely bare or with the hairs mainly or only on upper embossed part, seldom with hairs on lower part alone, in this case the lower calyptra of *Musca* type. Palpi not, or only very slightly and gradually, depressed and dilated at apex. Parafacialia almost always bare.

8 (9) If three *stpl* are present, the lower one seldom at the apex of an isosceles triangle, in these cases either the head holoptic or two reclinate frontal setae present, of which the *anterior* is the shorter one. Fore femur with a *pv* row of setae. Frons of male as a rule much narrower than that of female. Lower prostigmal seta curved upward or indistinct *PHAONIINAE*, p. 180

9 (8) Almost always three *stpl* present, the lower one of which lies at the apex of an isosceles—and as a rule practically equilateral—triangle; if the lower *stpl* fails or is moved towards the posterior one, the normal *pv* row of the fore femur missing. Frons at least one-fifth head-width and of subequal width in both sexes, with only one reclinate seta or with two, of which the *posterior* is the weaker one. Lower calyptra of *Phaonia* type. Lower prostigmal seta often curved downward . . *COENOSIINAE*

10 (7) Pteropleura with a group of fine erect hairs on lower part, just above the posterior *stpl*, and with the upper embossed part quite bare. Palpi with a spoon-shaped outline, conspicuously and more or less suddenly dilated and flattened in apical part. Parafacialia almost always finely setulose. Frons in both sexes about a third head-width, with two pairs of reclinate and outwardly-curved upper orbital setae, and without cruciate

interfrontals. Lower calyptra of *Phaonia* type. . . . *LISPINAE*

11 (6) Hind tibia with a strictly *d* seta beyond middle in addition to, and in strict alignment with, the *d* preapical. *sc* straight (near apex even as a rule very slightly concave behind) from the part farthest from *c* to tip (Pl. 2, fig. 20); seventh vein strongly curved outward, so that an imagined further extension of this and of the sixth vein would meet before reaching margin. Lower calyptra of *Phaonia* type or more or less reduced. (♀: Abdominal spiracles 6 and 7 present) *FANNIINAE*

12 (1) Sixth vein reaching or closely approaching margin of wing (Pl. 2, fig. 15) at least as fine fold (best seen when light is reflected by wing). Under side of scutellum almost always with erect fine pale hairs, which differ considerably from those on upper side and which are always present when sixth vein falls slightly short of margin. Lower calyptra of *Phaonia* type or more or less reduced. (♀: Abdominal spiracles 6 and 7 present) . *ANTHOMYIINAE*

The subfamilies *COENOSIINAE*, *LISPINAE*, *FANNIINAE* and *ANTHOMYIINAE* will be dealt with in a separate volume. The EGINIINI are included in *COENOSIINAE*. The number of abdominal spiracles of the female can only be established from microscopic slides, and this character, which is undoubtedly of some importance for classification and phylogeny, has therefore been checked in only some of the genera of each subfamily. As exceptions may still be discovered, the character has been placed in ( ).

Subfamily MUSCINAE

The subfamily is here given a more restricted scope than in my Ruwenzori paper for the reasons explained on p. 29 and appears to be a very natural group, which shows some transitional tendencies towards *PHAONIINAE* only in *Polietes*—and, to a lesser extent, in *Mesembrina*. All members of the subfamily have the upper embossed part of the pteropleura setulose and share this character with the *STOMOXYDINAE*, from which they differ by the normal, licking proboscis and the long-plumose arista (only *Haematostoma* and *Haematobia* having a few rays on under side in *STOMOXYDINAE*). All genera but *Polietes* have the broadened lower calyptra of the

Musca type, which does not occur in *STOMOXYDINAE*. The remaining subfamilies have the pteropleura bare, if they have a *Musca* type lower calyptra, and the *stpl* arranged in a pronounced triangle, *i.e.* the lower *stpl* conspicuously more ventrad than the posterior one, if the pteropleura is setulose on upper embossed part. A few genera in LIMNOPHORINI and MYDAEINI and a group of rather stout forms in PHAONIINI have a lower calyptra of the *Musca* type and are undoubtedly transitional towards these tribes.

Distribution.—World-wide, but species most numerous in the ORIENTAL and ETHIOPIAN REGIONS.

Biology.—Adults attracted by dung but also found on foliage and flowers, some species entering houses. Eggs on, or in the immediate vicinity of, excrements and sometimes other decaying matter, without flanges. Larvae coprophagous throughout their life, but in *Mesembrina* and *Polietes* the third-stage larva is a facultative predator.

Eggs.—The genera are not easily distinguished in this stage and, apart from the stalked forms (*see* p. 14), they differ mainly in size.

Larvae.—The third-stage larvae can be distinguished by the following key, which is of course to a large extent based on European species and therefore tentative. Details will be found in the papers of Muirhead Thomson (1937, 1947) and Zimin (1948) mentioned in the introduction.

1 (10) No accessory sclerites present below the mouth-hooks or only one more or less small sclerite present (Fig. 10*a*, *d*, *e*); dental sclerites paired, not connected. Slits of posterior spiracles always strongly meandering (Fig. 11*a*–*d*).

2 (3) Left mouth-hook much shorter than right one (Fig. 10*d*, *e*); accessory sclerites entirely absent below mouth-hooks. Not more than two pairs of fleshy tubercles at anal plate. Posterior spiracles separated by much less than their own width . . . . . *Musca* L., p. 40

3 (2) Mouth-hooks subequal (Fig. 10*a*).

4 (5) Terminal disc of abdomen surrounded by a well-defined edge (Fig. 9*b*), densely pitted. Anal plate very strongly transverse, about twenty times as wide as long. Posterior spiracles separated by more than their own width. Anterior margins of segments with jagged spinules. Accessory sclerites

entirely absent below mouth-hooks (*M. simplex* Loew, acc. to Zimin). *Morellia* R.-D., p. 92

5 (4) Terminal disc of abdomen not defined by an edge, gradually passing into lateral surface, smooth or wrinkled. Anal plate up to about ten times as wide as long. Posterior spiracles separated by much less than their own width. Accessory sclerites often (usually?) traceable below mouth-hooks.

6 (9) More than two pairs of fleshy tubercles present near anal plate.

7 (8) The outermost of the fleshy tubercles lies behind middle third or so of anal plate and is not asperate, anal plate extending farther dorsad (up to middle of height) on lateral surface. Cuticle greyish-olive. (*O. caesarion* Meig., *cornicina* F.)... . . . *Orthellia* R.-D., p. 116

8 (7) The outermost of the fleshy tubercles lies on outer side of anal plate, the paired tubercle behind middle third covered with asperities, anal plate extending less far dorsad. Cuticle greenish-yellow or yellow. (*P. cadaverina* F.).. *Pyrellia* R.-D., p. 134

9 (6) Only two pairs of fleshy tubercles present near anal plate, the outer pair strongly developed; lower half of terminal disc with a pair of slight prominences; several spinules present behind anal opening. Near middle of ventral creeping welts of 5th–7th abdominal segments 6 strong teeth present behind the first transverse row of spinules. (*D. asiatica* Zim.). *Dasyphora* R.-D., p. 139

10 (1) Two well-developed accessory sclerites present below mouth-hooks; dental sclerites connected so as to form an arch-like ventral median sclerite. Posterior spiracles separated by less than their own width.

11 (12) Anterior spiracles with 15 or more buds. Slits of posterior spiracles strongly meandering (with 4–5 loops)*. *Mesembrina* Meig., p. 114

---

* According to Portshinsky (1910) and Keilin and Tate (1930, *Parasitol.*, XXII, p. 179)—on the basis of Portshinsky's material—*M. mystacea* L. has only about 10 buds in the anterior and S-shaped slits in the posterior spiracles like *Polietes hirticrus* Meade. Apart

12 (11) Anterior spiracles with up to about 11 buds. Slits of posterior spiracles (S-shaped or) meandering with only two loops. .. .. *Polietes* Rond., p. 148

Key to the genera of MUSCINAE

1 (14) *m* strongly recurved. The anterior mesopleural replaced by 3–4 distinct setulae.

2 (7) Mid tibia without or with a *pv* seta beyond middle, in the latter case in some *Musca* with an *av* with which the *pv* seta must not be confused.

3 (6) r_1 bare above. Prosternum setulose (bare in some *Morellia*). Subcostal sclerite without setulae (but evenly covered with the normal velvet-like pile).

4 (5) Bend of *m* subangular (Pl. 1, fig. 2; but rather broadly rounded in *M. lucens*, Pl. 1, fig. 1). Outline of aristal plumosity forming a convex curve to tip, ovate (Fig. 12). Prostigmal present. Stem-vein with 1 to about 7 setulae on posterior side of dorsal surface..... *Musca* L., p. 40

5 (4) Bend of *m* broadly rounded (Figs. 23–25). Outline of aristal plumosity forming a very sharp angle at tip, lancet-shaped (Fig. 13). Prostigmal absent (very weak in *brunneisquama*). Stem-vein bare. *Morellia* R.-D., p. 92

6 (3) r_1 setulose above. Prosternum bare. Subcostal sclerite with some conspicuous black setulae at apex in addition to the velvet-like pile. Stem-vein bare. Type: (*Musca*) *aricioides* Walk. Mysol; Aru. In addition (*Ochromyia*) *fasciata* Macq. (= *Bengalia spissa* Walk.). Aru. . [*Aubertinella* gen. n.]

7 (2) Mid tibia with a strong *pv* seta beyond middle, or, in some males, with a row of very long thin *pv* bristles without or with one anterior mesopleural. Prostigmal seta distinct, except in a few brightly metallic blue or green species.

---

from the fact that the *mystacea* group is not known from the Oriental region, the identity of the larval characters and biology of these two species would seem to require confirmation. Possibly Portshinsky's *M. mystacea* larvae were in reality *P. hirticrus*.

8 (9) Scutellum with about 5 pairs of strong setae along margin. Body large, black and shining, base of wing broadly yellow. Prosternum not setulose. Subcostal sclerite with velvet-like pile only. *Mesembrina* Meig., p. 114

9 (8) Scutellum with the normal 2–3 pairs of strong marginal setae (in some *Dasyphora* in addition with 1–2 pairs of weak seta). Much smaller, bright metallic except some *Dasyphora*. Subcostal sclerite with one or several setulae in addition to the velvet-like pile.

10 (11) Suprasquamal ridge with black setulose hairs on posterior part. Prosternum setulose. 1–0 *ia*. *Orthellia* R.-D., p. 116

11 (10) Suprasquamal ridge bare apart from short yellowish pile.

12 (13) Only 1 *ia* (but sometimes with a stronger hair *closely* in front of it). Subcostal sclerite with only one setula. r_1 bare. Colour bright metallic. Prosternum bare, parallel-sided. .. . . *Pyrellia* R.-D., p. 134

13 (12) 2 *ia*. Subcostal sclerite normally with several black setulae. r_1 often setulose on part or all of its length. ... . *Dasyphora* R.-D., p. 139

14 (1) *m* virtually straight. Eyes densely hairy. 2(–3) *ia*. Prosternum bare (in the Oriental species). ♀: With cruciate interfrontals and proclinate orbitals. *Polietes* Rond., p. 148

Genus 1. MUSCA Linnaeus

Musca L., 1758, *Syst. Nat.* (X), p. 589. Genotype: *M. domestica* L. (Intern. Comm. Nomencl. 1925, Opin. 82).

sbg. *Byomyia* R.-D., 1830, *Myod.*, p. 392 (*Byomya*) (nec *Biomyia* Rond., 1856). Genotype: *tempestiva* Fln.

Biomyia Bezzi, 1923, *Bull. Soc. R. ent. Egypte, 1922*, p. 116 (emend.).

Pristirhynchomyia Brunetti, 1910, *Rec. Ind. Mus.*, **IV**, p. 91. Genotype: *conducens* Walk. (= *lineata* Brun.).

Awatia Tns., 1921, *Ins. Insc. mens.*, **IX**, p. 132. Genotype: *planiceps* Wied. (= *indica* Awati).

Pattonia Ho, 1938, *Ann. trop. Med. Paras.*, **XXXII**, p. 302. Genotype: *sorbens* Wied.

sbg. *Eumusca* Tns., 1911, *Proc. Ent. Soc. Wash.*, **XIII**, p. 170. Genotype: *autumnalis* Deg. (= *corvina* F.).

Emusca Mall., 1925, *Ann. Mag. n. H.* (9), **XVI**, p. 372. Genotype: *autumnalis* Deg.

sbg. *Lissosterna* Bezzi, 1923, *Bull. Soc. R. ent. Egypte, 1922*, p. 113. Genotype: *albina* Wied.
sbg. *Philaematomyia* Aust., 1909, *Ann. Mag. n. H.* (8), **III**, p. 295. Genotype: *crassirostris* Stein (= *insignis* Aust.).
sbg. *Plaxemyia* R.-D., 1830, *Myod.*, p. 392. Genotype: *vitripennis* Meig. (= *sugillatrix* R.-D.).
Placomyia Scudder, 1882, *Nomen. zool. Index*, p. 249 (emend.).
sbg. *Ptilolepis* Bezzi, 1921, *Ann. trop. Med. Paras.*, **XIV**, p. 335. Genotype: *inferior* Stein.
sbg. *Viviparomusca* Tns., 1915, *J. Ac. Sci. Washington*, **V**, p. 435. Genotype: *bezzii* P. and C.

Head: Eyes more closely approximated to contiguous in male, widely separated in female; parafrontalia, parafacialia, face and jowls covered with greyish pollinosity; outer verticals absent and inclinate frontal setae, except for the first pair, very fine to hair-like in male; ocellar bristles minute or indistinct in male, more strongly developed in female; in female parafrontalia with one or more series of small proclinate setulae outside series of inclinate frontal bristles; palpi well developed; proboscis in haematophagous species with thickened and heavily chitinized mentum; arista long plumose both above and below, the outline of the plumosity rather evenly convex even at tip (Fig. 12).

Thorax black, shining, generally covered with greyish dust, so that dorsum appears striped. 0+1 *ia*, 2—3+1—5 *dc*, 0+1 *acr*. Normally with a well-developed propleural, prostigmal, a small anterior mesopleural, a row of setae along hind margin of mesopleura and 3 strong *stpl*, which are arranged 1—1—1 in a very shallow curve. *Abdomen* without definite macrochaetae; ventrites completely exposed; hypopygium of male small. *Wings* hyaline; bend of fourth vein angular (Plate 1, fig. 1), although the angle may sometimes be rather obtuse, and (*lucens, tempestiva*) even rounded (Plate 1, fig. 2). Stem-vein with 1 to about 7 setulae on upper posterior side: setulae may be absent from, or extend along under side of, third longitudinal vein from node to tip for varying distances. Basicosta and halteres yellow in all Oriental species. *Legs* fuscous black.

Flies from 2·5–10 mm. in length, black, more or less covered with pollinosity, distinguished from allied genera by the lack of brilliant metallic colouration, the angular bend of *m* (Plate 1, figs. 1, 2) and especially the distinctive arista (Fig. 12).

The first real contribution to the study of the genus as a whole was made by Malloch when he discovered various

characters (some of them described previously by Awati) whereby the unwieldy mass of species could be separated into groups. *Viviparomusca, Byomyia, Plaxemyia, Eumusca, Philaematomyia, Ptilolepis* and *Musca* s. str. are here treated only as subgenera. Patton and Ho have studied the relationships of the species as indicated by a comparison of the genitalia of representative specimens. This work is of great value, but the genitalia do not, in this particular genus, afford suitable characters for speedy identification, and, as both Patton and Ho did not identify greater numbers of specimens from genitalic characters nor from the characters used by Malloch, their various publications are likely to contain the same species under different names.

Distribution.—The ORIENTAL and ETHIOPIAN REGIONS are much richer in species of *Musca* than other parts of the world and contain about an equal number of species, many being common to both regions. Only *domestica* is widely established in the NEW WORLD, but *autumnalis* has been found in Nova Scotia and New York State, and the PALAEARCTIC and AUSTRALIAN REGIONS contain a few species each. In the following descriptions synonyms of species names are only given if they concern the ORIENTAL REGION and adjacent areas, or if they have been used recently.

Biology.—At least some of the species of subgenus *Viviparomusca* are larviparous, and their female terminalia (Ho, 1938, *Ann. trop. Med. Paras.*, **XXXII**, 287) are only about one-third length of body with reduced bristling, the ninth ventrite anchor-shaped or scallop-shaped. *Musca* s. str., *Byomyia, Eumusca* and, according to Patton and Cragg (1913, *Ind. J med. Res.*, **I**, pp. 1–15), some *Viviparomusca* are oviparous, at least some species in the latter two subgenera laying pedicelled eggs, the terminalia being in *Eumusca* of a type somewhat differing from that of *Musca, Byomyia*, etc. The larvae live in excrements and other decaying organic matter and have been recorded, perhaps sometimes wrongly, as enemies of Orthopterous eggs and as occasional parasites of insects (*Hyponomeuta*), snails (*Helix*), and even vertebrates, including man, in which they are able to cause myiasis. The adults feed on excrements, food substances, sores, etc. etc., and can therefore mechanically transmit diseases like Typhoid, Dysentery, Cholera, and possibly Poliomyelitis. Many of the Oriental species are especially attracted to blood of sores or oozing from bites of other insects, and several species are able to use their prestomal teeth for scratching the skin.

The larvae of only a few species of *Musca* have been described comparatively, especially by Zimin (1948, *Opred. Faune S.S.S.R.*, 28), whose key contains seven species. Several of these occur in the ORIENTAL REGION, and it appears that the subgenera *Viviparomusca* and *Eumusca* can be separated from *Musca* s. str. and *Byomyia* by the shape of the anal plate, which extends dorsad to beyond middle of lateral surface, and whose outer (dorsal) extremity is truncate, the upper part being markedly broader. The anal plate of *Byomyia* is broadly visible in lateral view, but that of *Musca* s. str. is so small that it does not extend laterad beyond the outer tubercles.

Key to the Species of Musca

1	(6)	Propleura hairy in the depression between humeral callus and propleural bristle (Fig. 4*d*). Ventrobasal scale setulose. Suprasquamal ridge bare. Front tibiae without a submedian *pv* bristle. Thorax with four black vittae. (*Musca* s. str.) All *post dc* strong.	*domestica* L. 2, p. 54
2	(5)	Frons of male one-and-a-half to three times as wide as third antennal joint, head 5–12 times as wide as narrowest part of frons. Abdomen in both sexes in addition to the median vitta more or less infuscate at least on third and fourth segments.	
3	(4)	Frons of male about 2½ times as wide at narrowest part as third antennal joint, head 5–6·5 times as wide as narrowest part of frons. Abdomen largely infuscate in female, at least third and fourth segments infuscate in male. . .	*domestica domestica* L.
4	(3)	Frons of male up to about twice as wide at narrowest part as third antennal joint, head 7–12 times as wide as narrowest part of frons. Abdomen more or less bright orange, especially at the sides of the base, darkened on fourth segment and at least apex of third in male.	*domestica vicina* Macq., p. 55
5	(2)	Frons of male about as wide as third antennal joint or narrower, head 12–16 times as wide as narrowest part of frons. Abdomen bright orange, not infuscate on fourth segment, median vitta narrow on third segment and usually absent from fourth	*domestica nebulo* F., p. 55

6 (1) Propleura bare in the depression between humeral callus and propleural bristle.

7 (30) Suprasquamal ridge entirely bare (except for microscopic pile).* Ventrobasal scale normally bare. If the mid tibia has a distinct *av* submedian seta, the abdomen uniformly grey dusted but for a row of wedge-shaped median spots.

8 (9) *stpl* missing. Sternopleura glossy, not dusted, in female strongly contrasting. Front tibiae without a *pv* submedian bristle, mid tibiae without an *av* submedian bristle. Thorax of male glossy black, dusted at humeral calli, of female black with very dense whitish-grey dust on a pattern similar to that of *sorbens*. Abdomen mainly yellow in male, black, largely whitish dusted in female. (*Lissosterna* Bezzi). Eyes of male bare or almost bare. Posthumeral bristle absent. . . . . *albina albina* Wied., p. 56

9 (8) *stpl* present. Sternopleura dusted.

10 (29) Mid tibiae without an *av* postmedian bristle. Proboscis normal or slender, mentum less than twice as wide as third antennal segment.

11 (14) Eyes distinctly haired in both sexes, front tibiae without a submedian *pv* bristle. Abdomen of male testaceous on sides of second and third segments, abdomen of female entirely dark. Thorax of male without distinct vittae (in Oriental forms). (*Plaxemyia* R.-D.).

12 (13) Epistoma produced, head longer on lower surface than at base of antennae; proboscis long with the mentum extremely slender, rod-like. 2+3 *dc*. Thorax of male shining greenish black, practically undusted; of female very densely dusted, and with very conspicuous narrow, separate vittae. ♂: Dark median vitta of abdomen occupying less than a third width of second segment. ♀: Parafrontalia densely grey-dusted *vitripennis* Meig., p. 57

* The key is arranged in such a way that, if the wing is not spread out so as to expose the suprasquamal ridge entirely, it is sufficient at this juncture to ascertain the presence or absence of bristly hairs on the posterior part of the ridge, if necessary, after bending the alula with the tip of a pin towards the wing.

13 (12) Epistoma not produced, head shorter on ventral surface than at base of antennae; proboscis and mentum normal, the latter fusiform. 0+2 *dc*. Thorax of male matt black with only some grey dust at shoulders, of female with broad dark vittae, which are delimited by whitish and brown dust on disc. ♂: Abdomen largely dark, dark median vitta occupying more than half width of second segment, and enclosing a paramedian silver-dusted spot on intermediate segments. ♀: Parafrontalia almost entirely shining black *interrupta pilifacies* ssp. n., p. 58

14 (11) Eyes bare. (*Byomyia* R.-D.).

15 (26) Front tibiae without a *pv* bristle beyond middle. If the absence of small black bristles on lower front part of suprasquamal ridge has not been ascertained before and if r_{4+5} is not setulose beyond *r-m*, the former character must be checked now. The anterior suprasquamal bristles can be seen, if the wing is spread out perpendicularly, or else by lifting or tearing off the upper calyptra. *If these bristles are present, or if* r_{4+5} *is setulose beyond* r-m, *follow paragraph 31.*

16 (17) Abdomen entirely orange in both sexes, without any marks (though sometimes infuscate at apex by post-mortem rot), shining. Thorax black without metallic sheen, with four inconspicuous narrow vittae, pollinosity bluish and thin, not very conspicuous .... .. *ventrosa* Wied., p. 60

17 (16) Abdomen at least with a complete or incomplete longitudinal brown to black median vitta and always with conspicuous spots of pollinosity. If four thoracic vittae are present, the abdomen entirely black, or pollinosity of thorax very conspicuous.

18 (23) Anterior thoracic spiracle whitish. Scutellum with conspicuous whitish dust on a large part of its dorsal surface. Vein *m-m* rather straight or slightly sigmoid. Normally middle-sized. ♂: Abdomen orange at least on sides of second and third segments; hind tarsi

simple. ♀ : Second abdominal segment almost entirely dusted; parafrontalia with the setulae in several irregular rows.

19 (22) Thorax with the vittae of each side fused behind suture, thus with two broad vittae (Fig. 14). ♂ : First abdominal segment almost entirely dark brown, second and third segments with a very conspicuous dark brown vitta. ♀ : Abdomen entirely olivaceous-blackish except for the dusting and the ventral surface of the base, which is more or less testaceous.

20 (21) Ventrites orange. Thoracic vittae divided in front of suture. Bend of *m* *Musca*-like. ♂ : Second and third abdominal segments without hind marginal bands. *sorbens* Wied., p. 61

21 (20) Ventrites black. Bend of *m* (Pl. 1, fig. 1) almost *Morellia*-like. Thoracic vittae fused in front of suture. ♂: Second and third abdominal segments with dark brown hind marginal bands *lucens* Villen., p. 63

22 (19) Thorax with four separate vittae (Fig. 15).* First abdominal segment of both sexes light orange except for basal declivity and often a median vitta, remainder of abdomen largely orange, except for a conspicuous median vitta on second segment and usually a narrow one on third, fourth segment usually infuscate. Stem-vein with only 1(—2) setulose hairs.† Interfrontalia completely effaced behind middle (♂) or twice as wide as a parafrontale (♀) . . *pattoni* Aust., p. 64

23 (18) Thoracic spiracle black to brown. Abdomen entirely black in both

---

* Single specimens of the *domestica* group, in which the propleural hairs are lacking, may be traced to this species. They can be distinguished by more golden pollinosity and wider interfrontalia which, though narrow in the male of *nebulo*, are never effaced behind middle as in *pattoni* and which in the female are about four times as wide at widest part as the parafrontalia at the same level (in *pattoni* twice as wide as parafrontalia). If the bristly hairs at the lower front part of the suprasquamal ridge have been overlooked or are abnormally lacking some species of *Eumusca* might also be traced here.

† Stem-vein with 3–6 setulose hairs. Anterior *post dc* indistinct, *prst dc* weak, only the last 2 pairs of *post dc* strong. First tergite more extensively darkened; setulae on under side of r_{4+5} normally reaching to beyond *r-m*: *fletcheri* para. 44.

sexes, except for the pale dusting. Thorax with the vittae of each side not fused or without vittae, scutellum without any whitish dust on dorsal surface in male or in both sexes (though with the inconspicuous brown dust which covers the dark parts of the thorax). Vein *m-m* rather concave; wing membrane everywhere evenly and densely covered with hairs.* Very small species (2·5–3·5, seldom up to 4·5 mm.). ♀ : Second abdominal segment without whitish dust except for a lateral spot; parafrontalia with only one series of setulae.

24 (25) Either dorsum of thorax without distinct whitish dust at all (except at shoulders) and thus without vittae (♂), or scutellum dusted in the same way as mesonotum (♀). Hind tarsi simple. . . . . *tempestiva* Fen., p. 65

25 (24) Mesonotum with distinct whitish dust, especially just in front of scutellum, dorsal surface of scutellum without any whitish dust in either sex. ♂ : Third and fourth segments of hind tarsi with outstanding curled hairs, which are longer than diameter of tarsi. *fasciata* Stein, p. 67

26 (15) Front tibiae with a conspicuous *pv* bristle beyond middle. Proboscis normal; labella short and about as long as third antennal segment. Two well-developed *prst dc*, the second more than half, and usually almost as long as the last *post dc* but one. Anterior spiracle whitish. Thoracic hairs moderately short. Vittae on either side of mesonotum separated.

27 (28) First abdominal segment largely dark on dorsum, second and third orange in male except for a black median vitta; ground-colour of abdomen entirely dark on dorsum in female. Small, not over 5·6 mm. *conducens* Walk., p. 68

28 (27) First abdominal segment entirely or largely, second and third largely, orange in both sexes, abdomen

---

* If the basal and anterior half, including most of the discal cell, is almost devoid of hairs and perfectly hyaline, a female of *M. vitripennis* Meig. may be at hand in which the hairs of the eyes are inconspicuous.

somewhat more elongate and pointed. Medium-sized: 4·7–7·2 mm. *planiceps* Wied., p. 70

29 (10) Mid tibiae with a distinct *av* submedian bristle. Proboscis stout, mentum about thrice as wide as third antennal segment. Thorax, except for four narrow vittae, which remain separate on each side, and abdomen, except basal part of first segment, almost evenly covered with dense greyish dust; sides of mesonotum in the supra-alar area, sides of scutellum at base, and a wedge-shaped median spot on the abdominal segments fuscous. Palpi testaceous. Vein r_{4+5} with a few setulae only at base. (*Philaematomyia*).. *crassirostris* Stein, p. 71

30 (7) Suprasquamal ridge with bristly hairs on front extremity or on posterior part (Fig. 4). Ventrobasal scale setulose. If the mid tibia has a distinct *av* submedian seta, the abdomen with three dark vittae (and the setulae on ventral surface of r_{4+5} extending beyond *r-m*).

31 (46) Posterior part of suprasquamal ridge and dorsal surface of lower calyptra without erect bristly hairs (Sbg. *Eumusca* Tns.).

32 (45) Vittae of thorax not fused behind suture, thorax thus with four vittae throughout. Parafrontalia of female almost entirely greyish dusted, if the setulae on ventral surface of r_{4+5} reach beyond *r-m*.

33 (34) Mid tibiae with a conspicuous or 2–3 smaller *av* submedian bristles. Proboscis rather stout, half as wide again as third antennal segment. Setulae on ventral surface of r_{4+5} reaching well beyond *r-m*. Fuscous black, densely grey dusted abdomen of male sometimes testaceous translucent at sides; thorax with four narrow dark vittae, intermediate abdominal segments with 3 complete vittae. .. *senior whitei* Patt., p. 73

34 (33) Mid tibiae without an *av* seta. Abdomen of male never wholly dark.

35 (42) Setulae on ventral surface of vein r_{4+5} confined to base, not reaching *r-m*; seldom exceeding *r-m*, in this case posterior side of dorsal surface

of stem-vein with only 1(—2) setulose hairs, this place otherwise with up to about four bristles.

36 (39) Stem-vein with only 1(—2) setulose hairs. First abdominal segment largely pale in both sexes, or eyes distinctly short-haired.

37 (38) First abdominal segment (♂ ♀) light orange except for the basal declivity (in Ethiopian specimens light colouration somewhat less extended), ventrites orange (♂ ♀). Eyes bare. Fore tibia without a *pv* submedian seta.* Setulae on r_{4+5} restricted to region of basal node.† Hair of thorax very short, almost spinuliform, in female not longer than width of third antennal segment. Dark vittae of thorax moderately broad, the inner ones as wide in front of suture as behind. ♂: Interfrontalia entirely displaced by parafrontalia on anterior three-quarters of frons. ♀: Upper third or two-fifths of parafrontalia thinly dusted, blackish. *xanthomelas* Wied., p. 74

38 (37) First segment of abdomen wholly or largely (some males) black, ventrites and usually adjacent parts of the tergites black (Fig. 17), in female abdomen wholly black. Eyes distinctly short-haired, conspicuously so in male. Hair of thorax long and fine, 1½–2 times as long as width of third antennal segment. Dark vittae of thorax rather broad.. .. .. *hervei* Villen., p. 75

39 (36) One to four bristles on stem-vein. First abdominal segment largely or wholly black on dorsal surface and eyes virtually bare. Hair of thorax long and fine in front of suture, longer in ♀ than width of third antennal segment, seldom short (but fine, not spinuliform),

---

* *M. planiceps*, in which the setulae on r_{4+5} may reach beyond *r-m*, is distinguished by the presence of a *pv* submedian seta on the fore tibia, even more reduced dark colouration of the abdomen, and the absence of setulae from the suprasquamal ridge.

† Single specimens of *M. pattoni* may be traced to this species, from which they differ normally by the absence of setulose hairs from the suprasquamal ridge and by the presence of setulae on the apical section of r_{4+5}. They can further be recognized normally by greater size, in the male by longer thoracic hair (at least twice as long on dorsal presutural part of mesonotum as width of third antennal segment), and in the female by wholly densely pale dusted parafrontalia.

but then (female of *craggi*) inner vittae of thorax only half as wide in front of suture as behind it. Ventrites orange (♂ ♀).

40 (41) Inner vittae of thorax only half as wide in front of suture as behind it (Fig. 18), where the dust is rather thin and brownish-grey (♂) or grey (♀). Tergites of anterior three segments in female dull orange but for the fore and hind margins and a median vitta, in male intermediate segments bright yellowish orange but for a narrow but conspicuous dark brown median vitta. Hair of thorax short in female, only about as long as width of third antennal segment, in male about thrice as long. Anterior *post dc* rather short, in female often indistinct — *craggi* Patt., p. 77

41 (40) Inner vittae of thorax not narrower in front of suture than behind it. Tergites of intermediate segments in female entirely black, in male orange except for a broad dark median vitta, which is conspicuously widened to fore and hind margins. Hair of thorax fine and long, at least one-and-a-half times as long as width of third antennal segment in female, more than twice width of third antennal segment in male. All the *post dc* strong and well developed. — *autumnalis* Deg., p. 78

42 (35) Setulae on ventral surface of r_{4+5} almost reaching apex. Stem-vein with 3–7* bristles on posterior side of dorsal surface. Ventrites and ventral parts of tergites largely orange in both sexes.

43 (44) Anterior *post dc* well developed, though only moderately long. Mentum hardly wider than third antennal segment. ♂: Frons at narrowest part almost or fully as wide as third antennal segment — *lusoria* Wied., p. 79

44 (43) Anterior *post dc* indistinct. Mentum about twice as wide as third antennal segment. ♂: Frons at narrowest part at least twice width of third antennal joint — *fletcheri* Patt. and S.W., p. 80

45 (32) Vittae of thorax fused before and behind suture, thorax thus with

* If with 1(−2) setulae only, see *M. pattoni* Aust., para. 22.

two broad black vittae. Setulae on ventral surface of r_{4+5} reaching well beyond *r-m*. ♂: Eyes subcontiguous; colouration apparently as in female. ♀: Parafrontalia black and shining on upper fourth; vertex only a quarter head-width; abdomen dull orange with a moderately broad black median vitta and black incisures . *villeneuvei* Patt., p. 81

46 (31) Posterior part of suprasquamal ridge (Fig. 4 *sr*) or dorsal surface of lower calyptra with erect, black, bristly hairs (Fig. 4). Setulae on ventral surface of r_{4+5} reaching well beyond *r-m*. Thorax with four black stripes, basicosta yellow in all Oriental species.

47 (62) Lower calyptra without erect black bristly hairs. (*Viviparomusca*). 4 or more well-developed *post dc*. Palpi fuscous to black. Mentum normal, more or less slender. Parafacialia bare. ♂: Eyes separated by less than width of third antennal joint.

48 (53) Dorsal surface of first abdominal segment mainly or wholly black; if the hind margin is more or less broadly pale on each side, the dark median spot very broad and narrowest at hind margin of segment, and the pale transverse spot on each side of hind margin seldom approaching anterior declivity (Figs. 19, 20). Large species. ♀: Abdomen wholly black on dorsal surface (very seldom, the intermediate segments somewhat pale translucent at sides), but first segment always wholly black on dorsal surface, the following species not safely distinguishable (but *see* Distribution).

49 (50) Stem-vein with 4–7 setulae on hind side of dorsal surface. ♂: Median vitta of second tergite strongly dilated along fore margin, otherwise almost parallel-sided, and at hind margin never dilated, but as a rule slightly narrowed, moderately broad (Fig. 19). First tergite of male normally with a conspicuous pale spot on each side along hind margin. Eyes distinctly hairy.

	♀ : Ventrites more or less largely pale orange.	*bezzii* P. and C., p. 83
50 (49)	Stem-vein with 1–5 setulae on hind side of dorsal surface. ♂ : Median vitta of second tergite dilated along fore margin but also somewhat dilated behind, so that its lateral margins are more or less concave (Fig. 20). First tergite wholly or (individually) almost wholly black. Eyes not distinctly hairy.. .. .	*bakeri* Patt., p. 86
51 (52)	Ventrites more or less largely pale orange. Stem-vein normally with 3 setulae. ♂ : Pollinose spots of abdomen inconspicuous, not obscuring pattern .	*bakeri illingworthi* Patt., p. 84
52 (51)	Ventrites fuscous black (but *see* p. 86). Stem-vein with 3–5 setulae. ♂ : Pollinose spots of abdomen strongly developed and somewhat obscuring dark pattern.. .	*bakeri bakeri* Patt.
53 (48)	Dorsal surface of first abdominal segment mainly or wholly pale (Figs. 21, 22), rarely in female mostly black, but always with some pale colouration at least at sides; the dark median spot often reduced to extreme base or hind margin or both; if it forms a complete vitta this somewhat dilated at hind margin; pale colouration reaching or closely approaching anterior declivity on either side. ♂ : Eyes more or less distinctly haired.	
60 (61)	Stem-vein with 1–3 setulae on hind side of dorsal surface. Middle-sized species (4·5–7 mm.). Abdomen of male somewhat wider than long; median vitta (♂ ♀) broader, on first segment strongly dilated behind, on second often less than twice as long as wide (Fig. 21). ♀ : Dark colouration of abdomen more extended, hind margin of first segment as a rule narrowly piceous, the pale spot thus often narrowly surrounded everywhere by dark colouration.	*gibsoni* P. and C., p. 86
61 (60)	Stem-vein with 3–7 setulae on hind side of dorsal surface. Large species (7–9 mm.). Abdomen fully as long (all in) as wide, yellow colouration more extended, median vitta narrow, on first segment not or	

only slightly dilated behind and often missing, on second segment more than twice as long as wide at middle (Fig. 22). ♀ : Dark colouration of abdomen reduced, first segment and lateral parts of second often wholly pale on dorsum, seldom the abdomen largely dark on dorsal surface with the intermediate segments only narrowly pale translucent at sides, in this case the first tergite also pale translucent at sides .. *formosana* Mall., p. 88

62 (47) Lower calyptra with numerous erect bristly hairs on dorsal surface.

63 (64) Parafacialia and eyes bare. Suprasquamal ridge setulose both in front and behind. (Sbg. *Ptilolepis*).— Only the last two pairs of *dc* well developed, the others indistinct or small. Mentum stout, more than twice as wide as third antennal segment. ♂ : Only intermediate tergites inconspicuously brownish at sides. ♀ : Parafrontalia wholly pale grey dusted. .. *inferior* Stein, p. 89

64 (63) Parafacialia densely setulose (Fig. 2); eyes densely hairy. Suprasquamal ridge with setulae only in front (as in *Eumusca*). (Sbg. *Setimusca* nov.). —2+4 strong *dc*. Mentum normal, less than half again as wide as third antennal segment. Frons narrower than in corresponding sex of *inferior*. ♂ : Second and third tergites conspicuously and broadly pale yellow at sides. ♀ : Parafrontalia largely brown dusted. *malaisei* sp. n., p. 91

Subgenus **Musca** s. str.

Distinguished from all other groups of the genus by the hairy propleural depression.

Distribution.—Cosmopolitan.

The subgenus consists of *Musca domestica* L. and its forms, which are more climatic forms than subspecies. Tropical African *M. cuthbertsoni* Patton are somewhat more distinct; in Egypt, however, a form is found which by its key characters must be named *cuthbertsoni* and which is connected with f. *nebulo* by all transitions.

1. **Musca (Musca) domestica** Linnaeus.

(Figs. 4*a*, 8*c*, 10*d*)

1758. *Musca domestica* Linnaeus, *Syst. nat.*, X, 596. Types: Europe, Linn. Soc. London. America.

Head: Eyes bare, separated in male by $2\frac{1}{2}$ times width of third antennal segment, frons $\frac{1}{2}$–$\frac{1}{5}$ width of head, in female by almost a third width of head; interfrontalia black, more or less parallel-sided in male, somewhat narrowed in front and behind in female; parafrontalia almost linear in male except anteriorly, in female about equal to width of third antennal segment, sub-shining black on more than upper half, dusted anteriorly; most dorsal part of temples black in dorsal view except for a small spot behind upper extremity of eye; parafacialia, face and jowls silver-grey dusted, with yellow sheen in certain lights; antennae and palpi black; ocellar bristles poorly developed in male, distinct in female. *Thorax* black, covered with yellowish-grey tomentum; four black vittae of more or less equal width on dorsum, inner pair terminating towards posterior end of thorax, outer pair continued on to sides of scutellum, the latter black on median apical part, chaetotaxy normal. Propleural depression with fine erect setulose hairs, which are seldom reduced to one or none. Suprasquamal ridge without black setulae. *Abdomen* in male orange, with patches of silver-gold tomentum; first visible segment mainly orange, darkened centrally; second and third visible segments with black median vitta, slightly broader on second than on third, but the third usually wholly darkened (post-mortem); fourth visible segment somewhat darkened; hypopygium blackish-brown; fourth ventrite brownish, first to third orange. Abdomen of female grey with shifting pollinose pattern, first and second segments usually to a varying extent orange, second and third with central dark stripe. *Wings:* Basicosta yellow; stem-vein with one or two hairs on upper posterior side; node with a few fine setulae below. *Legs* black, fore tibia without a *p* seta; mid tibia without a *v* and *ad* seta.

Length.—4–8 mm., of wing 4·5–7·8 mm.

Distribution.—World-wide. In the Tropics and Subtropics *domestica* s. str. is very rare and normally replaced by the following two forms. Odd specimens of the typical form among *vicina* and *nebulo*: Baluchistan, Kashmir, Almora, U.P. (9,500). Darjeeling. YEMEN. ETHIOPIAN REGION.

Biology.—Being especially adapted to man and not flying towards the light when disturbed, *M domestica* has become

'the house fly', and is found in houses throughout the year. It is carried in ships and aeroplanes, and is regularly introduced from the temperate zone into harbours of the Tropics and Subtropics. Larvae especially in dung heaps and stables. A very full account of the biology, etc., with copious references has recently been published by L. S. West (1951, *The Housefly*, New York).

1(*a*). **Musca (Musca) domestica vicina** Macq.

1851. *Musca vicina* Macq., *Mem. Soc. Sc. Agric. Arts Lille*, 1850, 226 (*Dipt. exot.*, **4** *suppl.*, 253). Type: America. Mus. Paris.
1917. *Musca multispina* Awati, *Ind. J. med. Res.*, V, 179. Type: India (n. syn.).

Very similar to *M. domestica* L. and in the female sex not distinguishable. Eyes in male separated by one to two times width of antennal segment and by one-twelfth to one-seventh width of head. Abdomen rather more orange basally, in female normally quite orange basally with suffused dark central stripe on first and second visible segments.

Distribution.—World-wide in Tropical and Subtropical belt. Very common in the whole ORIENTAL REGION (Baluchistan and Kashmir to Ceylon and Burma and eastward to the Fiji Islands).

Biology.—This form is the common bazaar-and-house fly in the Tropics and Subtropics, its biology as far as is known is the same as that of the type form. Specimens were found in houses, slaughter-houses, at food and excrements.

1(*b*). **Musca (Musca) domestica nebulo** F.

1784. *Musca nebulo* F., *Ent. Syst.*, IV, 321. Type: India or.
1843. *Musca rufifrons* Macq., *Dipt. exot.*, II, 152. Type: Java (n. syn.).
1856. ! *Musca determinata* Walk., *Ins. Saunders*, 345; Patton, 1937, *Ann. trop. Med. Paras.*, XXXI, 128. Type: E. Indies. B.M.
1864. ! *Musca sordidissima* Walk., *Proc. Linn. Soc. London*, VII, 216. Type: Mysol. B.M. (n. syn.).
1917. *Musca divaricata* Awati, *Ind. J. med. Res.*, V, 182. Type: India (n. syn).

Eyes in male separated by width of third antennal segment or less and by less than one-twelfth width of head. Abdomen orange; first visible segment with dark central streak, on second segment streak broadening out anteriorly; black stripe continued on to third visible segment; infuscation on

last two abdominal segments variable, usually less extensive than in preceding form.

Distribution.—From EGYPT, YEMEN and PALESTINE to KASHMIR, MALAYA and CEYLON, especially common in India and Ceylon. This form is no more clearly separated from *vicina* than the latter from *domestica*, and the three forms are probably more climatic forms than established races.

Biology.—A common bazaar-and-house fly, also in slaughter-houses. Found on food, excrements, etc.

Subgenus **Lissosterna** Bezzi.

This monospecific group was based on the absence of *stpl.* For the rest the species is a typical *Byomyia.*

2. **Musca (Lissosterna) albina** Wiedemann.

1830. *Musca albina* Wied., *Aussereur. zweifl. Ins.*, **II**, 415. Type: East India. Mus. Vienna and Copenhagen.

Head: Eyes bare, separated by about width of third antennal segment (♂) or one-third head-width (♀), frons strongly widened anteriorly; interfrontalia fuscous black, parafrontalia and face very densely greyish-white dusted, upper half of male parafrontalia linear and glossy black, interfrontalia narrow and of almost uniform width, in female little more than half as wide as parafrontalia and rather evenly covered with small not very dense black hairs. Inclinate frontal setae hair-like but anterior 1–3 pairs somewhat stronger; ocellars indistinct or small, one small (♂) or two quite strong (♀) verticals. *Thorax* shining black, in male wholly glossy with only a patch of silvery pollinosity at shoulders, in female densely silver-grey dusted with four less dusted vittae, which tend to coalesce near suture, and a short median one towards scutellum; upper part of pleurae of female densely dusted, sternopleura thus contrasting glossy black. Dorsal setae absent except for the *prsc, dc* and the dorso-lateral setae, which are quite strong; pleural setae normal but *stpl* and anterior mesopleural absent; hair of mesonotum in male dense, fine and erect, about as long as antennal width; in female about a third that length and inconspicuous. *Abdomen* in male orange-yellow with the basal excavation and a median spot on hind margin of segments 1–3 glossy brown to black, fourth segment, except for a small dark spot on either side of middle, and disc of third densely silver-dusted; in female only the base of the anterior segments more or less dull orange, otherwise black

or fuscous, densely silver-grey-dusted, the median spots and a transverse spot on each side of hind margin of segments 1–3 and a pair of spots on segment 4 glossy. *Wings* hyaline, with hairs only on marginal part outside the cells and at apex of R_5; basicosta and base of veins creamy-yellow; veins, apart from costa and a setula on stem-vein, without setulae. *Legs* normal, fore tibia without a *pv*, mid tibia without an *av* and *ad* seta, hind tibia with a fringe of short *ad* setulae.

Length.—3·3–6 mm., of wings 3·4–5 mm.

Distribution.—CEYLON. INDIA. BALUCHISTAN. SYRIA. S.W. ARABIA. SUDAN. N. AFRICA (TUNISIA, EGYPT). S.W and W. AFRICA. A semi-desert species (Patton).

Subgenus **Plaxemyia** Robineau-Desvoidy.

The few species form undoubtedly a natural group, which differs from *Byomyia* by the densely haired eyes in connection with the unarmed *pv* surface of the front tibia. However, like *Lissosterna* the present subgenus is only a minor group and belongs essentially to *Byomyia*.

3. **Musca (Plaxemyia) vitripennis** Meigen.

1826. *Musca vitripennis* Meig., *Syst. Beschr.*, V, 73, pl. 43, fig. 34. Type: France. Mus. Paris?

1830. *Musca osiris* Wied., *Aussereur. zweifl. Ins.*, II, 420. Type: Egypt. Mus. Berlin and Vienna?

Head: Eyes in male thickly haired, separated by somewhat more than width of third antennal segment or by one-ninth head-width, in female microscopically haired, separated by fully one-third head-width; interfrontalia black with a silver sheen, widest at lower sixth and somewhat narrowed to beyond middle in male, in female about as wide as a parafrontale; parafrontalia covered with silver tomentum, the upper third in male black, almost undusted, female with fine hairs outside frontal series; face silver-dusted; ocellar bristles unrecognizable in male, distinct in female, male with one, female with two, strong verticals, frontal row irregularly double or triple, first pair strong, the others in female fine, in male dense, erect and very fine. *Thorax* in male shining black, with a greenish tinge, in female covered with silver-grey tomentum, with four narrow, well-separated undusted vittae; 1 *acr*, 2+2–3 *dc*; pleural setae normal. *Abdomen* in male yellowish-orange, first and fourth visible tergites broadly black, second and third with a broad black median vitta, the tip of the abdomen suffused with a golden metallic

sheen, first ventrite and hypopygium black, in female brassy-black, densely golden-grey dusted; in posterior view most of the first segment black, a moderately narrow median vitta—widened in front and behind—on second and a narrow one on third segment shining black. *Wings* hyaline, membrane hairy in apical third and more than posterior third; fourth vein rounded at an obtuse angle; basicosta pale yellow; veins pale yellow except at tip of wing; stem-vein with one setula; bristles at node very fine or absent, squama yellowish-white; halteres yellow, brown at base. *Legs* black in male, slightly greyish in female; fore tibia without a *pv* seta, mid tibia without a *v* and *ad* seta; hind tibia with a row of *ad* setulae.

Length.—3·7–6 mm., of wings 3·7–5·8 mm.

Distribution.—EUROPE. N. AFRICA. ARABIA. ASIA MINOR. LEBANON. PERSIA. TURCMENIA. BALUCHISTAN. N. INDIA (Kashmir). PALAEARCTIC.

Biology.—Mainly on and about animals in the field and about their excreta; will readily enter trains, an annoying fly, as it settles on the human skin in search of moisture (Patton, 1933, *Ann. trop. Med. Paras.*, **XXVII**, 408).

Zimin (1951, *Faune S.S.S.R., Dipt.*, **XVIII**(4), 93–128) distinguishes two 'species', *vitripennis* and *osiris*, the former being the Northern form, and the latter occurring in N. AFRICA (not the Ethiopian region), S. EUROPE, ARABIA, IRAN, KASHMIR, N. INDIA. The Southern form, which would seem to have both the characters and distribution of a subspecies rather than of a species, is said to differ from *vitripennis* s. str. by the slightly narrower frons of the male and somewhat less developed hair and setae of frons and jowls in both sexes. According to Zimin's distributional data the Indian form would belong to *vitripennis osiris*. I have no Oriental specimens and no North African males available, but a male from Crete and females from Egypt and other Mediterranean countries certainly do not differ from French *vitripennis* by narrower frons and less developed hairiness but rather in the opposite direction.

4. **Musca (Plaxemyia) interrupta pilifacies** ssp. n.

1923. *Musca dasyops* Stein, of Patton, *Philip. J. Sci.*, **XXIII**, 326; Ho, 1938, *Ann. trop. Med. Paras.*, **XXXII**, 287, nec Stein.

1937. *Musca* sp. n., Patton, *Ann. trop. Med. Paras.*, **XXXI**, 209.

♂ ♀ : *Head:* Eyes densely long-haired, especially in male, subcontiguous (♂) or separated by three-tenths head-width

(♀), more widely separated at lunula, interfrontalia fuscous, in male linear behind middle, but as wide as lunula in front, in female broad with convex sides; parafrontalia fuscous, slightly shining, uniformly covered with long fine bristles outside frontal series; clypeus rather deeply excavated, like parafacialia and jowls covered with silver tomentum, facial ridges dilated, and in their entire length like the jowls covered with numerous black setulose hairs, which are arranged in several rows and rather long in male; occiput shining black, succiput covered with silver tomentum; ocellar bristles indistinguishable in male, very fine and barely recognizable in female; male with one fine, female with two moderately strong, verticals; frontal rows consisting of fine and dense setae in male and irregularly double or triple, in female of moderately strong rather widely spaced setae. *Thorax* only slightly shining black; in female with a short median vitta of grey dust and faint indications of similar vittae on the *dc* line; humeri thickly, and pleurae sparsely covered with silver tomentum (♀). 1 *acr*, 0+2 *dc*, the *prst* 2 sometimes indicated, pleural setae normal, but anterior mesopleural absent. *Abdomen* black, including fore and hind margins of intermediate segments, but in male presenting a translucent orange spot occupying most of lateral quarter of these segments, and a transverse patch of silver tomentum on each lateral half, which leaves fore and hind margin and median vitta dark and which is slightly extended backward on paramedian part, these patches sometimes dissolved into two roundish patches each. *Wings* hyaline, membrane everywhere hairy; basicosta brown; stem-vein with one hair on dorsal posterior side; bristles on node only; lower calyptra brownish. *Legs* black; femora lightly grey-dusted below; fore tibia without a *pv* seta, in male densely short-haired on *v* surface; mid tibia without an *ad* and *v* seta; hind tibia with a rather conspicuous row of short *ad* setulae.

Length.—4·5–7·0 mm., of wings 5–7·2 mm.

Distribution.—FORMOSA: Mt. Lu-lin, U-fen, Chia-i, 16.-IV.54 (*Su-yung Liu*), ♂ type (in B.M.), 1 ♂ 8 ♀ paratypes (in B.M. and Taiwan Malaria Research Institute, Formosa); Mei-chi, Jen-ai, Nan-tou, 24.I.54, on Water-buffalo (*Suyung Liu*), 1 ♂ paratype (in B.M.). BURMA (*E. Y Watson*), 1 ♂ paratype (in B.M.); Kambaiti, 2,000 m., 26.IV.34 (*R. Malaise*), 1 ♀ paratype (in Mus. Stockholm), 11.V.34, 1 ♀ paratype (in B.M.). CHINA: Hong Kong, 5.III.06 (*Brunetti*), 1 ♂ paratype (in B.M.). Recorded by Patton from Canton. The type form in S. Africa and ssp. *dasyops* Stein on high mountains of E. Africa.

Patton (1937) stated that *M. dasyops* from S.W. and C. China is a species different from the real *M. dasyops* Stein (type loc. Kilimanjaro). Though I consider it as undoubtedly conspecific with the Ethiopian forms, it belongs to a well-defined subspecies, which differs by the formation of the facial ridges and in the female sex by the fusion of the silver spots on the intermediate abdominal segments. Pale dust of mesonotum less dense and conspicuous, and not clearly interrupting the outer dark vitta. The facial ridges coalesced with the setulose area of the jowls, triangular, and with numerous hairs, especially in male, whilst in *dasyops* they are of even width on lower half or even somewhat tapering below, adorned with only 1–2 rows of setulae, and separated from upper part of setulose area of jowls by an extension of the bare area (which in male is dull brown-red). *M. dasyops* is now considered to be a subspecies of the S. African *interrupta* Walk. (van Emden, 1939, *B.M. Ruwenzori Exped.*, **II**, 82), from which *pilifacies* can be distinguished by the same characters as from *dasyops*.

Subgenus **Byomyia** Robineau-Desvoidy.

Propleural depression and suprasquamal ridge without any setulae. If *Lissosterna*, *Plaxemyia* and *Philaematomyia* are maintained as separate small subgenera, this definition must be extended by the following characters: *stpl* present, eyes practically bare unless the fore tibia has a *pv* submedian seta, and mid tibia without an *av* submedian seta.

Distribution.—Practically all parts of the Old World, not found in Britain and New Zealand.

5. **Musca (Byomyia) ventrosa** Wiedemann.

1830. *Musca ventrosa* Wied., *Aussereur. zweifl. Insekt.*, **II**, 656. Type: Sumatra; China. Mus. Copenhagen and Vienna.
1860. ! *Musca xanthomela* Walk., *Journ. Proc. Linn. Soc.*, **IV**, 139. Type: Celebes: Macassar. B.M.
1909. *Musca nigrithorax* Stein, *Tijdschr. v. Ent., Deel*, **LII**, 212. Type: Java: Samarang; Batavia. Mus. Amsterdam.
1917. *Musca kasauliensis* Awati, *Ind. J. med. Res.*, **V**, 160. Type: India.

Head: Eyes bare, in male separated by less than half width of third antennal segment, in female by slightly over a quarter head-width; interfrontalia dark brownish-black, in male linear behind, very narrow anteriorly, in female 4–5 times width of one parafrontale; parafrontalia black towards vertex, thickly silver- or grey-dusted anteriorly, in male

linear behind, in female on lower half with 2–3 irregular rows of proclinate setulae; parafacialia shining silver-dusted in male, less brilliantly dusted in female; facial ridges almost as wide as third antennal segment, with a single row of very minute bristles for a short distance; inclinate frontal setae well developed in female, hair-like with the first well developed in male; ocellar bristles indistinct in male, well developed in female; one rather strong (♂) or two strong (♀) verticals. *Thorax* shining black, thinly and evenly covered with whitish-grey dust, dorsum with four narrow rather inconspicuous vittae, the broad central silver pollinose stripe more definite, 1 *acr*, 2+4 *dc*; pleural setae normal. *Abdomen* entirely orange (tip and even disc sometimes discoloured in dead specimens), with a few small patches of silver dust when examined obliquely from behind. *Wings* hyaline; veins yellow towards base; setulae on under side of r_{4+5} present only at base; stem-vein with one bristle on upper posterior side; basicosta yellow. Squama yellowish-white; halteres yellow. *Legs* black; fore tibia without a *p* seta; mid tibia without *av* or *ad* setae; hind tibia with a row of short and unequal rather strong and pointed semi-decumbent *ad* setulae.

Length.—4–6 mm., of wings 3·8–5·5 mm.

Distribution.—Widely distributed in the ETHIOPIAN and ORIENTAL REGIONS from W. and E. AFRICA, INDIA, CEYLON, BURMA, MALAYA to FORMOSA, CELEBES, SOLOMON IS. and N. QUEENSLAND.

Biology.—On cattle and horses in the field, haematophagous, feeding on wounds, sores and bites inflicted by other insects, also visiting excrements.

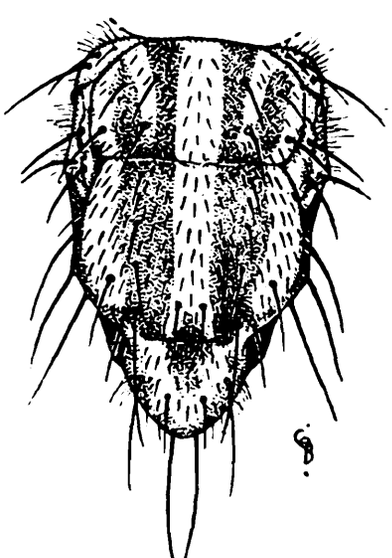
6. **Musca (Byomyia) sorbens** Wiedemann.

(Fig. 14)

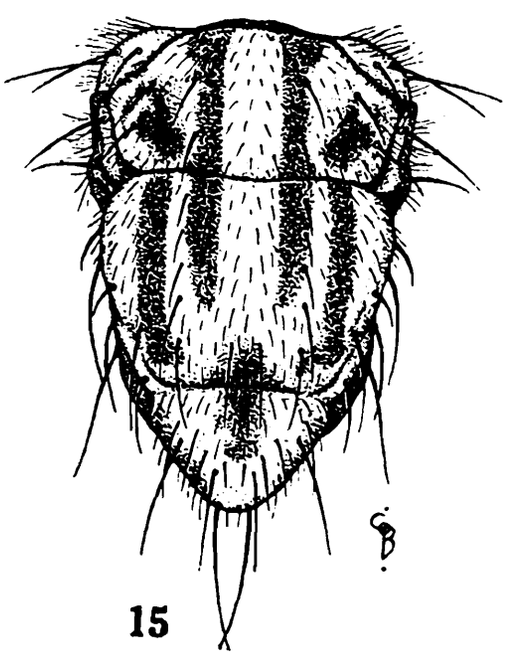
1830. *Musca sorbens* Wied., *Aussereur. zweifll. Ins.*, II, 418. Type: Sierra Leone. Mus. Vienna or Copenhagen.
Musca humilis Wied., *l.c.*, 418. Type: East India. Mus. Vienna or Copenhagen.
Musca latifrons Wied., *l.c.*, 656. Types: Macao. Mus. Copenhagen and Vienna (?).
Musca mediana Wied., *l.c.*, 657. Type: China. Mus. Copenhagen and Vienna (?).
1849. ! *Musca vetustissima* Walk., *List. Dipt.*, IV, 902. Type: New Holland. B.M.
! *Musca primitiva* Walk., *List. Dipt.*, IV, 903. Type: S. China: Fu-chou-fu. B.M. (n. syn.).

1868. *Musca bivittata* Thoms., *Eugenies Resa Dipt.*, 547. Type: Manila. Mus. Stockholm.
Musca niveisquama Thoms., *l.c.*, 467. Types: China; Malacca; Manila. Mus. Stockholm.
1875. *Musca scapularis* Rond., *Ann. Mus. Gen.*, **VII**, 428. Type: Borneo.
1887. *Musca eutaeniata* Big., *Bull. Soc. ent. France*, **XII**, 605. Types: S. India: Pondicherry; Cochinchina.
1917. *Musca promisca* Awati, *Ind. J. med. Res.*, **V**, 548–567. Type: India.

Head: Eyes bare, in male separated by width of third antennal segment or less, in female by almost a third head-width; interfrontalia black, narrow in male, even anteriorly, in female less than twice width of one parafrontale; parafrontalia in female shining grey to silver-dusted, with two series of setulae outside frontal row face and jowls shining silver-grey-dusted. Inclinate frontal setae in male dense and, except for the first, very fine, in female well developed; ocellars small, one (♂) or two (♀), well-developed verticals. *Thorax* (Fig. 14) shining black; central pollinose stripe well



14



15

FIG. 14. *Musca* (*Byomyia*) *sorbens* Wied., dorsal view of thorax.
FIG. 15. *Musca* (*Byomyia*) *pattoni* Aust., dorsal view of thorax.

defined, with a broad glossy black vitta on either side, which are more or less bifurcate anteriorly, especially in female; humeri and sides of dorsum silver pollinose; 1 *acr*, 2+4–6 *dc*, the anterior *post dc* often small in male when more than 4 are present; pleural setae normal. *Abdomen:* In male first tergite brown to black on dorsum, second to fourth orange with black vitta which widens anteriorly on second and

posteriorly on third, the orange part overlaid with patches of silver-gold tomentum, fourth tergite more or less darkened in dead specimens; hypopygium and fourth ventrite black; in female greyish-fuscous, sometimes dull brownish-yellow translucent at sides, intermediate segments with four broad patches of golden-grey or silver tomentum, fourth wholly dusted but with dark reflections on median third; ventrites dark grey. *Wings* with pale veins and basicosta; setulae confined to node; stem-vein with one fine bristle on upper posterior side. Lower calyptra pure white in female, off-white in male.

Length.—3·8–5·5 mm., of wing 3·4–5·5 mm.

Distribution.—Throughout the ETHIOPIAN, ORIENTAL and AUSTRALIAN REGIONS. ARABIA. IRAQ. IRAN. AFGHANISTAN. BALUCHISTAN. CEYLON. INDIA. BURMA. MALAYA. SUMATRA. S. and N. CHINA, etc.

Biology.—Very common and bothersome in camps and bazaars, less often entering houses. On foodstuffs, wounds, sores, often sucking sweat or the discharges of eyes, etc. Believed to be a mechanical transmitter of organisms causing eye diseases. The larvae are found in dung in the open, the fly breeding often in very small quantities of dung. Dwarfed adults are therefore frequent.

7. **Musca (Byomyia) lucens** Villeneuve.

(Pl. 1, fig. 1)

1922. *Pristirynchomyia lucens* Villen., *Ann. Sci. nat.* (*Zool.*) (10), V, 336. Type: Kandy.

1923. *Musca lucens* Villen., Patton, *Philipp. J. Sc.*, **XXIII**, 332; Patton and Senior White, 1924, *Rec. Ind. Mus.*, **XXVI**, 567; Patton, 1937, *Ann. trop. Med. Paras.*, **XXXI**, 134.

Head in male with bare contiguous eyes; interfrontalia fuscous black, linear, only anterior and posterior extremities slightly dilated; parafrontalia linear, except in anterior third, with numerous fine hair-like inclinate setae, the first pair only slightly stronger; ocellars small, inner verticals moderately strong, outer verticals absent (♂). *Thorax* shining black, rather densely silver-grey-dusted with some brownish dust in places, a broad vitta on each side undusted, slightly wider than the silver-dusted median vitta, and not divided anteriorly (♂); dorsal surface of scutellum narrowly glossy black at base, otherwise moderately densely brownish-grey dusted, apex and base of lateral surface with a glossy black spot. 2+5 *dc*, anterior *post dc* very small; pleural setae normal. *Abdomen* with the first and fourth tergites, the ventrites, the posterior fourth to fifth of the intermediate

tergites, and a not very narrow median vitta with concave sides fuscous-black, the intermediate segments and the antero-ventral part of the first otherwise brownish-yellow; the second to fourth segments evenly pale golden-grey dusted, except on median vitta and hind margins of the second and third. *Wings* with light brown veins; membrane evenly haired; setulae on r_{4+5} confined to node; *m-m* conspicuously oblique, somewhat concave, meeting *m* almost half-way between *r-m* and bend, the latter unusually broadly rounded (Fig. 2). Lower calyptra evenly smoky, except at base; halteres pale yellowish. *Legs:* Fore tibia without a *p* seta, mid femur on basal third with 3–4 *av* and 3–4 *pv* setae, these setae short, increasing in length from the proximal to the distal one, mid tibia without an *av* and *ad* seta near middle; hind femur with a conspicuous *av* and *pv* seta at basal third and 3–4 *av* setae near apex.

Length.—5·7 mm., of wings 4·8 mm.

♀: Frons almost width of an eye; interfrontalia one-third width of an eye; vertex steel blue. Thoracic vittae entire or slightly divided before suture. Abdomen light brown, second to fourth segments with some bluish-grey dust, ventrites black (ex Patton).

Distribution.—CEYLON (Kandy, C. Ceylon; Trincomalee; Haregam). Re-described from a male from Trincomalee, 13.I.92, in B.M.; the females mentioned by Patton are not now in the B.M.; N.E. BURMA (Kambaiti, 2,000 mtr., *R. Malaise*), a small female (3·7 mm. long), which appears to be this species, but in which the interfrontalia at middle are thrice the width of a parafrontale.

8. **Musca (Byomyia) pattoni** Austen.

(Fig. 15)

1910. ! *Musca pattoni* Aust., *Ann. Mag. n. H.* (*8*), V, 114. Types: Guindy, Saidapet (B.M.).
1917. *Musca spinosa* Awati, *Ind. J. med. Res.*, V, 162, Pl. 20 (n. syn.).
1922. *Musca incerta* Patton, *Ind. J. med. Res.*, X, 71. Types: Madras; Coonoor. Liverpool School of Trop. Med. (n. syn.).
1923. ! *Musca yerburyi* Patton, *Philipp. J. Sci.*, XXIII, 329 (nom. nov. pro *incerta* Patt. nec Walk.).

Head with bare eyes, which are contiguous or subcontiguous in male and separated at vertex by less than a third head-width in female; interfrontalia fuscous-black, linear in middle third and narrow in front and behind in male, spindle-shaped and 2–3 times as wide as a parafrontale in

female; parafrontalia of male densely silver-dusted on at least anterior half with rather fine and numerous inclinate setae, which gradually become finer and shorter above; of female wholly densely pale grey-dusted, with rather strong inclinate setae and 1–2 irregular rows of proclinate setulae, among which 2–3 somewhat stronger orbital setae are distinguishable on upper third; male with very small ocellars and only inner verticals moderately strong, female with moderately strong ocellars and strong inner and outer verticals. *Thorax* (Fig. 15) shining black, densely dusted golden-grey to cinereous-grey, with four conspicuous, well-separated undusted vittae; scutellum dusted except for a large spot on basal part of lateral surface, an apical spot and a subtriangular basal spot, the latter two sometimes coalescing; 1 *acr*, 2+5–6 *dc*, the anterior *post* ones small but distinct; pleural setae normal; hair of female short and spinulose; propleural depression bare; suprasquamal ridge without setulae. *Abdomen* pale ferruginous, with dark basal excavation and a rather narrow piceous median vitta on second segment, which is usually present more narrowly on third and is in male often extended to the basal excavation of the first; hind margin of third segment usually narrowly browned in female; male hypopygium dark. *Wings* with light brown veins, membrane everywhere hairy; setulae on r_{4+5} confined to base or extending further, often almost to tip; basicosta yellow; stem-vein with 1(–2) setulae. Lower calyptra greyish-white (♀) to yellowish-smoky (♂); halteres yellow. *Legs:* Fore tibia without a *p* seta, mid tibia without an *av* or *ad* seta.

Length.—4·5–7·7 mm., of wings 5–6 mm.

Distribution.—CEYLON. S. INDIA to N.W UNITED PROVINCES (Uttar Pradesh) and ASSAM.

Biology.—Attracted to sores of living and to dead animals, also common in bazaars; larvae in cow-dung.

Owing to the variability of the setulae on r_{4+5} and the similarity with other species *pattoni* has often been misunderstood. Austen himself included in his paratypes specimens of *xanthomelas*, *formosana* and *gibsoni* (but none of these species from Guindy). Patton named specimens of *gibsoni* as *pattoni* and re-described the latter as *yerburyi* (type seen).

9. **Musca (Byomyia) tempestiva** Fallén.

(Fig. 16)

1817. *Musca tempestiva* Fln., *K. Vet. Ac. Handl. 1816* (2), 254. Types: S. Sweden (Kivik in Skåne). Mus. Stockholm and Lund.

Wholly black in ground-colour with slight bluish reflections. *Head* with bare eyes; male with eyes subcontiguous, interfrontalia linear throughout, or at middle and narrow in front and behind, inclinate setae hair-like, the first pair somewhat stronger, ocellars fine but distinct, inner verticals strong, outer verticals absent; in female vertex almost to fully one-third head-width, interfrontalia at middle three times width of a parafrontale, narrowed in front and behind; parafrontalia

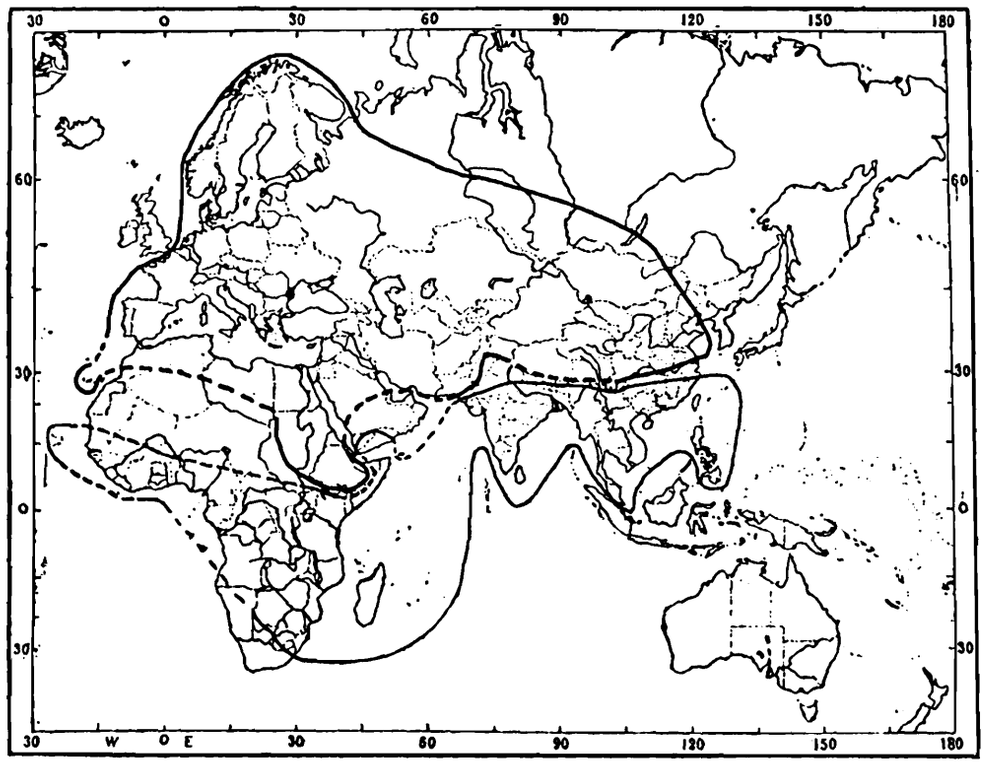


FIG. 16. Distribution of *Musca tempestiva* Fln. (——) and *M. fasciata* Stein (– – –). A broken line indicates that the species is not definitely known to occur in the country delimited or traversed by it.

densely dusted cinereous-grey with short but quite strong inclinate setae, a row of proclinate setulae and 1–2 small but distinct proclinate and one reclinate seta on upper third, ocellars and inner and outer verticals strong. *Thorax* of male undusted and glossy black on dorsal surface, including scutellum, with some silver dust at shoulders; of female densely dusted cinereous-grey including scutellum, with four narrow undusted vittae; 1 *acr*, 2+4–5 *dc*, the anterior *post dc* small or indistinct; pleural setae normal. *Abdomen* densely dusted silver-grey on second to fourth segments with a narrow median vitta on third and a rather narrow one on second in male, whilst in female only about the outer fourth of the second segment is pale dusted, the dark area in both sexes with concave outer margins and dilated into a narrow dark

hind and fore margin. Anterior thoracic spiracle brown-grey to fuscous. *Wings* with brownish-yellow veins and wholly hairy membrane, setulae on r_{4+5} minute, confined to node; bend of *m* rather rounded, but apical cross-vein distinctly concave; *m-m* markedly concave. Calyptrae whitish; halteres pale yellow. *Legs:* Fore tibia without a *p* seta, mid tibia without an *av* and *ad* seta; hind tarsi without distinctive setulae.

Length.—2·7–4 mm., of wings 2·3–3·5 mm.

Distribution.—(Fig. 16): EUROPE (but not Britain), CANARY IS., EGYPT to CENTRAL ABYSSINIA and IRAQ, ARABIA, PERSIA, CENTRAL ASIA, SIBERIA, N. and CENTRAL CHINA, but entering the ORIENTAL REGION only along the N.W FRONTIER and in KASHMIR. In B.M. from Reshun-Buni Road near Coldstream.

10. **Musca (Byomyia) fasciata** Stein.

(Fig. 16)

1910. ! *Musca fasciata* Stein, *Proc. Linn. Soc. London*, **XIV**, 149; Hennig, 1952, *Beitr. Ent.*, **II**, 92. Type: Seychelles, Mahé. In B.M.

1917. *Musca minuta* Awati, *Ind. J. med. Res.*, **V**, 160. Type: India (n. syn.).

Wholly black in ground-colour, sometimes with slight brassy reflections, especially on abdomen; thorax and abdomen with whitish dust and an undusted pattern, but scutellum wholly undusted on dorsal surface in posterior view. *Head* with silver-dusted parafacialia and anterior three-fifths of parafrontalia; eyes bare, in male frons less than width of third antennal segment, with obsolete interfrontalia; frons of female almost a third head-width, parafrontalia about a quarter width of interfrontalia above middle but not much narrower than them at lunula, with a row of proclinate setulae outward of the inclinate setae, and on upper black part with a proclinate and a reclinate seta, which are very small. *Thorax* with the mesonotum not very densely dusted and with four undusted vittae, which are not very conspicuous except in fresh specimens; with 1 *acr* and 2+5–6 *dc*, only the last 3 of the *post* ones being conspicuous; pleural setae normal. Anterior thoracic spiracle brown to fuscous. *Abdomen* with the third and fourth tergites moderately densely dusted whitish, except on a median vitta, which is very narrow on the fourth, and on a narrow anterior and posterior margin of the third segment; second segment of male similar to third, of female almost without pale dust

except on a patch on lateral surface; first segment undusted. *Wings* with light brown veins and entirely hairy membrane; bend of *m* rather rounded, but apical cross-vein conspicuously concave behind it, *m-m* also distinctly concave; stem-vein with only one seta on posterior surface; setulae at base of r_{4+5} minute and confined to node. Calyptrae whitish; halteres pale yellowish. *Legs:* Fore tibia without a *pv* seta; mid tibia without an *av* or *ad* seta; hind tibia with an irregular row of unequal short *ad* setulae. ♂: Hind tarsus with a row of curved fine setulose hairs on third and fourth segments, which are almost 2–3 times as long as the diameter of the tarsi.

Length.—2·6–4·0 mm., of wings 2·4–3·7 mm. (specimens from Réunion, etc., up to 4·7 mm. long, with a wing length of 4·2 mm.).

Distribution.—(Fig. 16): Uncommon but probably occurring in the whole of CEYLON. INDIA (known from Coimbatore, S. India; Agra, U.P. (Uttar Pradesh); Jabalpur, C.P. (Madhya Pradesh); Calcutta). BURMA and MALAYA (Patton). Also distributed over the ETHIOPIAN REGION (CAPE VERDE ISLANDS, GOLD COAST, BECHUANALAND, NATAL to UGANDA and KENYA. S.W ARABIA), MADAGASCAR, RÉUNION, MAURITIUS, SEYCHELLES. S. CHINA, FORMOSA (Hennig), RIU-KIU ISLAND and PHILIPPINES. *M. fasciata* is mutually exclusive ('vicariant') with *tempestiva* and—though clearly differing and hitherto always treated as a good species—may therefore ultimately be reduced to the rank of a subspecies.

Biology.—A haematophagous species, which is found on and about animals, but also excrements. It likes to suck sweat and may locally become bothersome.

11. **Musca (Byomyia) conducens** Walker.

1860. ! *Musca conducens* Walk., *Journ. Proc. Linn. Soc.*, IV, 138. Type: Macassar. B.M.
1864. ! *Musca praecox* Walk., *l.c.*, VII, 236. Type: Ceram. B.M.
1910. ! *Pristirhynchomyia lineata* Brun., *Rec. Ind. Mus.*, IV, 91, Pl. 8, figs. 1-2. Types: Calcutta. Indian Museum, Calcutta and B.M.
1917. ? *Musca lati-parafrons* Awati, *Ind. J. med. Res.*, V, 160. Type: India (n. syn.).

Head: Eyes bare; frons of male one-third to almost fully width of third antennal segment, interfrontalia very narrow, often obsolete above middle, parafrontalia silver-dusted with slight golden reflections; frons of female at vertex three-tenths head-width, parafrontalia densely dusted cinereous-grey or pale greyish-golden, a third width of interfrontalia,

outwards of the rather short inclinate setae with a row of proclinate setulae, and at upper end 2–3 very small upper orbitals. *Thorax* fuscous-black, moderately densely dusted whitish-grey, the dust brownish in places on dorsum and, where it remains whitish, with some bluish (opalescent) reflections, the two undusted vittae on either side rather close together towards and behind suture, the inner ones terminating at middle of *post* part in male but usually reaching level of last *dc* in female; 1 *acr*, 2+5–6 *dc*, the anterior 2–3 *post* ones weak, pleural setae normal. Anterior thoracic spiracle whitish. *Abdomen* wholly glossy piceous-brown on dorsal surface of first segment; second and third segments in male pale orange with a well-defined narrow piceous median vitta, the third also with a narrow infuscate hind margin, fourth like second to fourth of female strongly infuscate, the posterior three segments densely dusted pale golden or (♀) golden-grey except in the second and third segments on the median vitta, and in female on narrow fore and hind margins. *Wings* with light brown veins and wholly hairy membrane; stem-vein with one fine bristle on posterior surface; setulose hairs of r_{4+5} minute and confined to node; bend of *m* rather rounded, but apical cross-vein markedly concave. behind it *m-m* also somewhat concave. Calyptrae of male markedly brownish except along margin; halteres pale yellow. *Legs:* Fore tibia with a *pv* seta towards apical third; mid tibia without an *av* or *ad* seta.

Length.—3·5–5·6 mm., of wings 3·3–4·9 mm.

Distribution.—From SIERRA LEONE through the whole of the ETHIOPIAN and ORIENTAL REGIONS to NEW GUINEA. CEYLON. INDIA: C.P. (Madhya Pradesh); Punjab to Bengal and Assam; S. India; Andaman Is. BURMA. SUMATRA. JAVA. MALAYA. THAILAND. CHINA (Hong Kong; Shanghai). FORMOSA. PHILIPPINES.

Bionomics.—Haematophagous, common on and around cattle, feeding at sores and wounds. Brunetti captured *c.* 500 specimens on sores of a dying cow (together with only 5 ♀ of *domestica* s.lat. and 20 *sorbens*); 85% were females. In Senior White's breeding experiments (1944, *Ind. J vet. Sci.*, XIV, 123) this species with 92% formed the bulk of all flies hatching from dung collected in the open, and the ratio of males to females was 1 to almost 2.

The seta of the fore tibia is very distinctive of this species and the next (and in addition 2–3 Ethiopian species), but among *c.* 1 000 normal specimens two or three without this seta have been found.

12. **Musca (Byomyia) planiceps** Wiedemann.

1824. *Musca planiceps* Wied., *Anal. ent.*, 48; 1830, *Aussereur. zweifl. Ins.*, **II**, 414. Type: Java. Mus. Copenhagen.
1887. *Musca cingalaisina* Big., *Bull. Soc. zool. France*, **XII**, 606. Type: Ceylon.
1909. *Musca pollinosa* Stein, *Tijdschr. Ent.*, **LII**, 211. Types: Batavia; Semarang; Tandjong Priok. Mus. Amsterdam.
1917. *Musca indica* Awati, *Ind. J. med. Res.*, **V**, 160. Type: India.
1936. *Musca* (*Awatia*) *formosana* Mall., of Patton, *Ann. trop. Med. Paras.*, **XXX**, 130; Ch'i Ho, 1938, *Ibid.*, **XXXII**, 307, nec Malloch.

Head fuscous with silver-grey dust, which on the parafrontalia of the female becomes more cinereous; eyes bare; frons of male up to about half width of third antennal segment, interfrontalia very narrow or obsolete; frons of female almost a third head-width, parafrontalia half as wide as interfrontalia, outwards of the rather short inclinate setae with a row of proclinate setulae and two small upper orbital setae. *Thorax* fuscous, rather densely dusted pale grey, the dust more cinereous on disc, with four narrow, well-separated vittae; scutellum densely pale dusted with a small undusted apical spot, the usual spot at base of lateral surface, and often a small triangular median spot at base. 1 *acr*; 2+5–6 *dc*, the anterior *post* ones small; pleural setae normal; suprasquamal ridge without any setulae. *Abdomen* brownish-yellow with a more or less brown median vitta, which is seldom complete even on the anterior segments and usually restricted to a brown longitudinal spot at the apex of the segments; rather densely dusted pale golden, except on median vitta and usually an irregular longitudinal spot at the middle of each lateral half. *Wings* with brown veins, which turn light brown at base, and wholly hairy membrane; stem-vein with one seta on posterior surface, r_{4+5} usually setulose only on or near node, but setulae sometimes extending well beyond *r-m*. Calyptrae whitish, the disc sometimes brownish suffused. *Legs:* Fore tibia with a conspicuous *pv* seta towards apical third; mid tibia without an *av* or *ad* seta.

Length.—4·7–7·2 mm., of wings 4·0–6·4 mm.

Distribution.—CEYLON. INDIA: S. India; C. (Madhya Pradesh) and N. (Uttar Pradesh) India (Jabalpur; Mhow; Lucknow). S. CHINA (Hainan). JAVA. SOEMBAWA (Hennig). Presumably also in ASSAM, BURMA, MALAYA, though from there I have not seen this species.

Biology.—Another blood-sucking species, which is found on cattle but also sucks on cow-dung. In Senior White's (1944, *Ind. J vet. Sci.*, **XIV**, 123) breeding experiments from cow-dung this species took second place with 2½% of all the Diptera hatching from dung collected in the open. The species is viviparous, the larvae being born as an early third instar, and the puparium is dark brown with distinct pale segmental rings, which are distinctive of this species. Up to 78% of the pupae were parasitized by the Staphylinid beetle *Aleochara trivialis* Kraatz.

Subgenus **Philaematomyia** Austen.

The subgenus was created (as a genus) because of the stout proboscis of *crassirostris* with its prestomal teeth, but *M. inferior, senior whitei* and a few other species are more or less similar in this character. The well-developed *av* seta of the mid tibia is a more reliable character of *crassirostris*. It only occurs—in a less well-defined condition—in *senior whitei*, which may actually be closely related to *crassirostris* and *inferior*. However, the relationship even with *senior whitei* is uncertain, and it seems preferable not to disturb the major grouping of the genus *Musca* on the setulae of the suprasquamal ridge. *Philaematomyia* is restricted, therefore, to the only species with an *av* seta on the mid tibia and, at the same time, bare suprasquamal ridge.

Distribution and *Biology* as in *crassirostris*.

13. **Musca (Philaematomyia) crassirostris** Stein.

(Fig. 11*b*)

1903. *Musca crassirostris* Stein, *Mitt. zool. Mus. Berlin*, **II**, 99. Types: Luxor; Cairo; Assuan (Egypt). Mus. Berlin.

1904. *Musca modesta* de Meijere, *Bijdr. Dierk.*, **XVIII**, 106. Types: Pasuruan (Java). Mus. Amsterdam.

1909. ! *Philaematomyia insignis* Aust., *Ann. Mag. n. H.* (*8*), **III**, 298. Type: 'India'. B.M.

Wholly fuscous-black with pale orange palpi; densely dusted cinereous-grey. *Head:* Eyes bare; frons of male almost as wide as third antennal segment; interfrontalia piceous-black, very narrow, becoming linear behind middle, parafacialia densely dusted pale grey, fully a third width of third antennal segment; frons of female more than a third to almost two-fifths head-width; interfrontalia somewhat narrower to slightly wider at middle than a parafrontale; the latter outwards of the short inclinate setae with two rows of proclinate setulae, and on upper part with 3 small

orbitals, which are bent outward. Proboscis short and stout, mentum glossy piceous-brown, almost thrice as wide as third antennal segment. *Thorax* with four narrow well-separated black vittae; scutellum with a basal dark spot on lateral surface, usually without a dark apical spot, sometimes with irregular small shifting spots on dorsal surface; 1 *acr*, 2+2 *dc*, the anterior *post dc* being indistinct; pleural setae normal, but propleural and prostigmal rather weak; supra-alar ridges without setulae. *Abdomen* densely dusted pale grey, sometimes with slight shifting spots and dots, intermediate segments with a triangular median spot at base and, especially second segment, often with an indefinite narrow dark basal band, basal part of first segment also dark; intersegmental area contrasting piceous-black where exposed. *Wings* with light brown veins and wholly hairy membrane; stem-vein with 1–3 very fine bristles on posterior surface; setulae of r_{4+5} minute and confined to node. Calyptrae greyish-white or slightly brownish. *Legs:* Fore tibia without a *pv* seta; mid tibia with an *av* seta at apical third.

Length.—4·7–6·5 mm., of wings 4·2–5·3 mm., but dwarfed specimens down to 3·5 mm. length are at hand.

Distribution.—EASTERN MEDITERRANEAN (EGYPT, CYPRUS, PALESTINE, etc.) SOCOTRA. SUDAN. BELGIAN CONGO. S. RHODESIA and TRANSVAAL and the whole of the ORIENTAL REGION. CEYLON. INDIA, e.g. Coimbatore; Pusa; Gauhati. BURMA. MALAYA. INDONESIA. THAILAND. FORMOSA. PHILIPPINES.

Biology.—A very common blood-sucking species, the biology of which was studied by Patton and Cragg (1912, *Ann. trop. Med. Paras.*. V, 515). It is often seen sucking blood from the legs and abdomen of cattle, horses and donkeys, and it is said occasionally to bite man. The species has been found in numbers on the puttees of a collector probing with their proboscis, and in another case the males have been observed in hundreds making a following swarm. Cornwall and Patton (1914, *Ind. J. med. Res.*, **II**, 569–593) report on the effect of bites and the presence of a powerful anticoagulin in the salivary excretion. The females often crowd together to lay one large mass of eggs under the surface of the dung. The egg and larva have been described by Muirhead Thomson (1947, *Proc. R. ent. Soc. Lond.* (A), **XXII**, 92).

Subgenus **Eumusca** Townsend.

Propleural depression bare. Suprasquamal ridge with a group of setulae at anterior end but not on posterior part. Lower calyptra bare on dorsal surface.

The setulae on the suprasquamal ridge are absent in rare individuals, and allowance for these exceptions has been made in the key.

Distribution.—ETHIOPIAN and ORIENTAL REGIONS.

14. **Musca (Eumusca) senior whitei** Patton.

1922. ! *Musca senior whitei* Patton, *Ind. J. med. Res.*, **X**, 73; Patton and Senior White, 1924, *Rec. Ind. Mus.*, **XXVI**, 576, Pl. 31, fig. 24, Pl. 33, fig. 52; Patton, 1937, *Ann. trop. Med. Paras.*, **XXXI**, 134, Fig. 5. Types: Krishna R. and Kollar Lake, Bezwada Dist., Madras [Andhra Pradesh]. B.M. and Liverpool School Trop. Med.

1928. *Byomyia tibiseta* Malloch, *Ent. Mitt.*, **XVII**, 334. Type: Fort de Kock, Sumatra. Mus. Amsterdam (n. syn.).

Wholly black in ground-colour, only in male the abdomen sometimes testaceous translucent laterally, rather densely dusted whitish-grey, sometimes with an admixture of brownish dust on dorsum. *Head:* Eyes virtually bare—in male separated by distance equal to half to full width of third antennal segment, interfrontalia fuscous-black, almost linear, parafrontalia linear, wholly pale dusted, frons of female at vertex almost to fully one-third head-width, interfrontalia somewhat wider at middle and somewhat narrower in front than a parafrontale, to the outer side of the inclinate setae an irregular double row of proclinate setulae and 3 small upper orbitals. Mentum one-and-a-half times as wide as third antennal segment. *Thorax* with four narrow undusted vittae, the inner ones in male not exceeding middle of *post* part and somewhat widened to hind end; scutellum with a basal spot on lateral and an apical spot, which tends to extend to base, on dorsal surface; 1 *acr*; 2+5–6 *dc*, but the *post* ones indistinct except for the last two pairs; pleural setae normal, but propleural and prostigmal setae weak. Suprasquamal ridge with a group of erect black setulae on anterior part. *Abdomen* with a complete undusted glossy-black median vitta, which is moderately broad in front and becomes narrower on each segment, often linear on the fourth; in addition with a row of elongate spots at middle of each lateral half, which form a complete or interrupted vitta on either side. *Wings* with light brown veins and wholly haired membrane; stem-vein with 3–4 bristles on posterior surface, r_{4+5} setulose nearly to apex on under side but not even to *r-m* on upper side. Lower calyptra of male infuscate on disc. *Legs:* Fore tibia without a *pv* seta; mid tibia with 1–3 *av* setae.

Length.—5·8–7·3 mm., of wings 4·8–6·2 mm.

Distribution.—CEYLON. INDIA: S. India; and Calcutta. BURMA. MALAYA. SIAM. S. CHINA (Canton; Hainan). JAVA (Patton). SUMATRA (*tibiseta*). PHILIPPINE Is. (Patton).

Biology.—The slightly incrassate proboscis and its structure indicate haematophagous habits (Patton). *M tibiseta* (with 2–3 smaller *av* setae on the mid tibia) was described in *Byomyia*, but specimens which fit the description belong to *Eumusca*. It may be queried whether the *av* seta of the mid tibia, the somewhat incrassate proboscis and the dark colouration of the abdomen are less important characters than the setulae on the suprasquamal ridge and on r_{4+5}. If not, this species and *crassirostris* should be united in *Philaematomyia*. The male genitalia (especially the parameres) are, however, those of *Eumusca* in *senior whitei* and those of *Byomyia* in *crassirostris* (Patton, 1937), a fact which would support the present classification.

15. **Musca (Eumusca) xanthomelas** Wiedemann.

1824. *Musca xanthomelas* Wied., *Anal. ent.*, 49; Patton and Senior White, 1924, *Rec. Ind. Mus.*, **XXVI**, 571, Pl., **XXX**, fig. 15, **XXXIII**, fig. 46; Patton, 1933, *Ann. trop. Med. Paras.*, **XXVII**, 423; 1936, *Ibid.*, **XXX**, 481; 1937, *Ibid.*, **XXXI**, 199. Type: Java. Mus. Copenhagen.

1917. *Musca setigera* Awati, *Ind. J. med. Res.*, **V**, 170. Type: India.

Head: Eyes bare, in male contiguous, with the facets of the inner, upper part conspicuously enlarged; vertex of female about a third head-width, interfrontalia almost or fully twice the width of a parafrontale, the latter thinly dusted on upper third, with a row of short inclinate setae and 2–3 irregular rows of proclinate setulae, the interior upper ones of which are rather long, the upper orbitals therefore not clearly distinguishable. *Thorax* with four moderately broad glossy black vittae, which reach hind end of mesonotum, and with unusually short hair, which even at middle of *prst* part is not (♀) or only slightly (♂) longer than width of third antennal segment and which is rigid and spinulose in female; scutellum with a basal spot on lateral surface and a large apical spot, which often reaches base; 1 *acr*, 2+4–6 *dc*, the *post* ones small, except for the last two pairs; pleural setae normal. Suprasquamal ridge with some erect black setulae anteriorly. *Abdomen* largely pale orange, with the basal excavation and a median vitta pioeous-brown, the latter more or less dilated on the hind margins and sometimes also

at base of second segment, sometimes incomplete. *Wings* with the veins becoming creamy or brownish-white near base, membrane wholly hairy; stem-vein with only one bristle on posterior side of dorsal surface, r_{4+5} with a few minute setulae on basal node. Calyptrae greyish-white, sometimes slightly smoky. *Legs:* Fore tibia without a *pv* seta; mid tibia without an *av* or *ad* seta.

Length.—4·5–6 mm., of wings 4·3–5·3 mm.

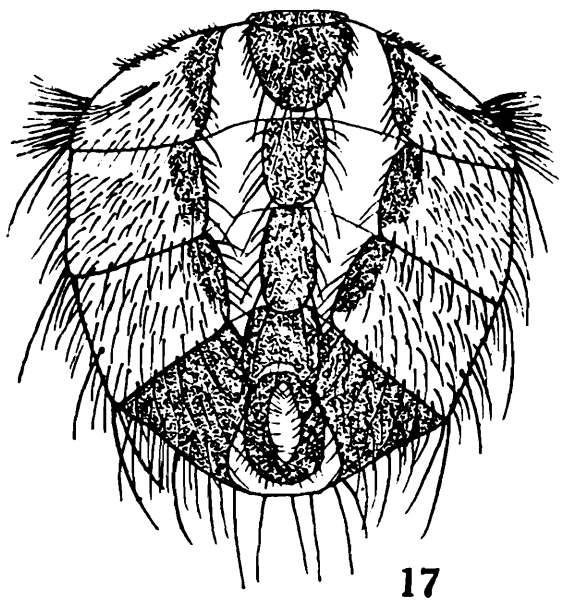
Distribution.—CEYLON. INDIA: Madras; United Provinces (Uttar Pradesh); Punjab; Bengal. BURMA. JAVA (type loc.). S. CHINA (Canton; Hainan). Also in the ETHIOPIAN REGION (S., E. and C. AFRICA). MAURITIUS.

Biology.—On and about animals, sucking sores, and on excrements; haematophagous. The puparium is brownish-white, and the fly has been bred from cow-dung.

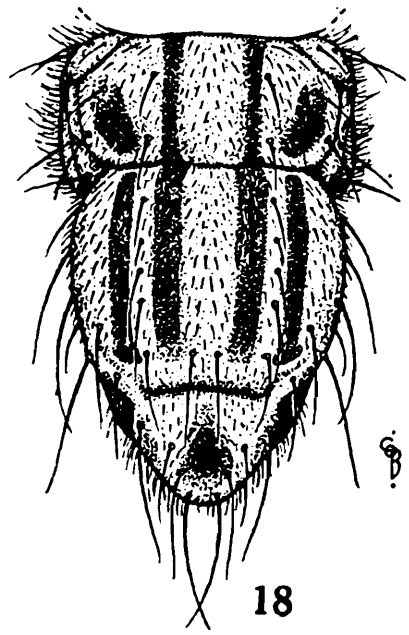
16. **Musca (Eumusca) hervei** Villeneuve.

(Fig. 17)

1922. *Musca hervei* Villen., *Ann. Sci. nat.* (*Zool.*) (10), V, 335; Patton and Senior White, 1924, *Rec. Ind. Mus.*, **XXVI**, 572, Fig. 16; Patton, 1933, *Ann. trop. Med. Paras.*, **XXVII**, 426; 1937, *Ibid.*, **XXXI**, 199. Types: Tonkin; China.



17



18

FIG. 17. *Musca* (*Eumusca*) *hervei* Villen. Ventral view of male abdomen.

FIG. 18. *Musca* (*Eumusca*) *craggi* Patton. Dorsal view of thorax.

Fuscous-black, in female abdomen concolorous, in male second and third, and sometimes posterior part of first, abdominal segments testaceous except for a moderately broad

fuscous median vitta and for a narrow infuscate hind margin, especially on third segment, under side largely testaceous with the ventrites and the ventral edges of the tergites contrastingly fuscous-black (Fig. 17); whitish-grey dusted, usually with some brown dust on disc of dorsal surface, especially on thorax behind suture and between the vittae on each side, and on upper half of parafrontalia. *Head* with rather conspicuously short-haired eyes, which are contiguous in male and separated by three-tenths head-width at vertex in female; interfrontalia (♂) obsolete on middle third, narrow in front and behind; female interfrontalia about twice as wide at middle as a parafrontale, the latter with a row of quite strong inclinate setae and about three rows of rather long proclinate setulae, among which 2–4 slightly stronger bristles on upper third represent the upper orbitals. *Thorax* with four conspicuous rather broad vittae, the disc (especially in male) with more or less extended brown pollinosity, so that in male it often appears largely glossy black but always conspicuously whitish dusted near neck or up to suture; 1 *acr*, 2+4 strong *dc*; pleural setae normal. Anterior end of suprasquamal ridge with some erect black setulae. *Abdomen* on intermediate segments with two pairs of roundish pale dusted spots which sometimes tend to coalesce on either side, first segment with a pair of smaller more widely separated pale dusted spots, fourth wholly pollinose with shifting spots. *Wings* with light brown veins and entirely hairy membrane; stem-vein with one bristle on posterior side of dorsal surface, setulae on r_{4+5} confined to node. Lower calyptra whitish grey, sometimes slightly browned on outer part of disc. *Legs:* Fore tibia without a *pv* seta; mid tibia without an *av* or *ad* seta.

Length.—5·8–7·7 mm., of wings 5·8–7·2 mm.

Distribution.—Mountain ranges of N. INDIA (Punjab; Simla; Sikkim; Bengal: Darjeeling; Assam). BURMA. N. and C. CHINA (Hankow; Peiping; Tientsin; Shantung).

Biology.—Haematophagous; on and about cattle, horses and cow-dung. The species is oviparous, the eggs being laid in patches of cow-dung in the field (according to Patton, 1933, but Patton—in collections named by him—possibly only before it was described, was not very clear about this species, since he identified it as *gibsoni*, *bezzii*, and even *nebulo*). Ch'i Ho's remarks on the female genitalia refer probably to *M. bezzii* (*see* van Emden, 1939, *B.M. Ruwenzori Exp. II*, 75).

17. **Musca (Eumusca) craggi** Patton.

(Fig. 18)

1922. *Musca craggi* Patton, *Ind. J. med. Res.*, X, 75; 1923, *Phil. J. Sci.*, XXIII, 315; 1937, *Ann. trop. Med. Paras.*, XXXI, 136. Types: Nilambur District, S. India. Liverpool School Trop. Med.

1924. *Musca pulla* Bezzi of Patton and Senior White, *Rec. Ind. Mus.*, XXVI, 568, Figs. 9, 36.

Head: Eyes bare, in male contiguous, separated by linear to obsolete interfrontalia, which are slightly broader in front and behind, and by linear parafrontalia; in female vertex only slightly more than a quarter head-width, interfrontalia at middle nearly thrice width of a parafrontale, the latter with rather short inclinate setae and an irregular, in places double, row of proclinate setulae, three upper orbitals rather distinct on upper third, where the parafrontalia are only thinly dusted grey. *Thorax* (Fig. 18) moderately thickly dusted whitish, rather glossy and dark, especially in male, with four black undusted vittae, the inner ones moderately broad behind suture and rather distinctly narrower in front of suture, about half as wide at level of anterior *prst dc* as at anterior *post dc*; 1 *acr*, 2+5 *dc*, the anterior two *post dc* small; pleural setae normal. Anterior end of suprasquamal ridge with some erect black setulae. *Abdomen* of male pale testaceous with the dorsum of the first segment and a narrow median vitta on the intermediate segments piceous, fourth segment irregularly darkened, hind margin of third narrowly piceous; in female the pale colouration is more dull reddish-yellow and the piceous median vitta as well as the hind and front margins of the intermediate segments are more broadly piceous and more suffused. Intermediate segments in male with two pairs of oblong spots of pale golden dust, in female with more roundish and more silvery spots of dust. *Wings* with light brown veins and wholly haired membrane; stem-vein with 1–3 fine bristles on posterior side of dorsal surface; setulae on r_{4+5} confined to node. Lower calyptra somewhat smoky in male, greyish-white in female. *Legs:* Fore tibia without a *pv* seta; mid tibia without an *ad* or *av* seta.

Length.—4·7–6·3 mm., of wings 4·5–5·5 mm.

Distribution.—CEYLON. INDIA (S. India; Bihar: Pusa). MALAYA. SIAM. PHILIPPINE IS.

Biology.—Found on cattle and buffaloes, near cattle sheds and on cow-dung. It was stated by Malloch (1929, *Ann. Mag. n. H.* (10), IV, 110) that the true *M. pulla* Bezzi, of which he studied the type, is a synonym of *M. conducens* Wlk.

18. **Musca (Eumusca) autumnalis** DeGeer.

1779. *Musca autumnalis* DeGeer, *Ins.*, **VI**, 83; Patton, 1933, *Ann. rop. Med. Paras.*, **XXVII**, 428; 1937, *l.c.*, **XXXI**, 207. Type: Sweden.

1922. *Musca prashadi* Patton, *Ind. J. med. Res.*, **X**, 69; Patton and Senior White, 1924, *Rec. Ind. Mus.*, **XXVI**, 573, Figs. 19, 47. Types: Kashmir: Gundarbal, 6,000 ft.; Baniar; Koharnag. Liverpool School Trop. Med.

Head: Eyes virtually bare; in male contiguous, with interfrontalia obsolete in middle part and very narrow anteriorly, parafrontalia linear; in female separated at vertex by one-third head-width, interfrontalia at widest part (middle) hardly half again as wide as a parafrontale, the latter with a row of rather strong but not very long inclinate setae, often arranged in double or triple row near middle, and with 2–3 rows of black proclinate setulae, which on more than upper third are bent more outward than forward, with 3–4 stronger bristles representing the upper orbitals. *Thorax* glossy black, in male with rather thin whitish dust and four broad black vittae, in female with rather thick whitish-grey dust and moderately narrow vittae, the latter only slightly narrower at anterior *prst dc*; 1 *acr*, 2+4 strong and almost equal *dc*; pleural setae normal. Suprasquamal ridge with a tuft of erect black setulae at anterior end. *Abdomen* piceous-black (♂) or fuscous (♀), second and third segments in male yellowish-brown with a rather broad black median vitta, which on the second segment occupies $\frac{1}{4}$–$\frac{1}{5}$ the width of the segment and on the third $\frac{1}{5}$–$\frac{1}{7}$, and which is somewhat dilated to fore and hind margins, so that its lateral margins are concave; with two pairs of large pale golden or golden-grey dusted spots, which tend to fuse, fourth tergite wholly dusted with shifting spots. *Wings* with light brown veins and wholly haired membrane; stem-vein normally with three bristles on posterior part of dorsal surface; setulae on r_{4+5} confined to node. Lower calyptra whitish-grey, in male sometimes very slightly smoky. *Legs:* Fore tibia without a *pv* seta; mid tibia without an *ad* or *av* seta.

Length.—5·2–7·7 mm., of wings 5·0–6·4 mm., but the Oriental specimens seen do not exceed 6 mm. (5·7 mm. wing length).

Distribution.—PALAEARCTIC REGION, EASTERN NEARCTIC REGION (Nova Scotia; New York State, Vockeroth, 1953, *Canad. Ent.*, **LXXXV**, 422), in the ORIENTAL REGION only in KASHMIR: Gandarbal; Baniar; Koharnag; Dal Lake; Nagin.

Biology.—On cattle and horses and on cow-dung; haematophagous according to Patton.

19. **Musca (Eumusca) lusoria** Wiedemann.

(Pl. 1, fig. 2)

1824. *Musca lusoria* Wiedemann, *Analecta ent.*, 47; 1830, *Aussereur. zweifl. Ins.*, **II**, 411. Type: Cape. Mus. Copenhagen.

1917. *Musca spinohumera* Awati, *Ind. J. med. Res.*, **V**, 167, Pl., **XXII**; Patton, 1922, *Bull. ent. Res.*, **XII**, 421; Patton and Senior White, 1924, *Rec. Ind. Mus.*, **XXVI**, 571, Figs. 14, 43; Patton, 1937, *Ann. trop. Med. Paras.*, **XXXI**, 196. Type: N. India (n. syn.).

Head: Eyes bare, separated in male by up to width of third antennal segment or contiguous, interfrontalia very narrow, often linear above middle, parafrontalia linear except in front; in female vertex three-tenths head-width, interfrontalia less than half again as wide above middle as parafrontalia, almost parallel-sided, parafrontalia with strong rather short inclinate setae, and 2–3 rows of black proclinate setulae, upper third black and almost undusted, with 3–4 stronger setulae, which are bent more or less outward. *Thorax* rather densely dusted whitish- or yellowish-grey, with four rather broad, in female narrower, undusted black vittae, the disc in male often with some greyish-brown dust between the vittae; 1 *acr*, 2+4 strong *dc*, sometimes the anterior *post* ones smaller and duplicated; pleural setae normal. Anterior end of suprasquamal ridge with some erect black setulae. *Abdomen* of male largely pale orange, first segment piceous-black with the lateral part of the hind margin somewhat invaded by the pale colouration, a moderately broad median vitta on the second and a rather narrow one on the third segment also dark, disc of fourth segment and narrow hind margin of third usually darkened; abdomen of female fuscous with the dorsolateral parts dull reddish translucent; pollinosity consisting of two pairs of large sometimes coalescing spots on the intermediate segments and occupying the fourth segment entirely, forming shifting spots. *Wings* with light brown veins and entirely hairy membrane; stem-vein with 5–7 bristles on posterior part of dorsal surface, setulae on r_{4+5} extending to about level of *m-m*. Lower calyptra greyish-white, seldom very slightly brownish. *Legs:* Fore tibia without a *pv* seta; mid tibia without an *av* or *ad* seta.

Length.—5·8–7 mm., of wings 5·1–6 mm.

Distribution.—Eastern part of the ETHIOPIAN REGION (Cape Province to Sudan and to Katanga in Belgian Congo). S. ARABIA. CEYLON. S. INDIA (Coimbatore). C. INDIA and N. INDIA (common in the Gangetic Plain). BURMA.

Biology.—Haematophagous, on animals, especially cattle, and on cow-dung. Both the genitalia and the exterior characters of the Oriental and the Ethiopian specimens are identical, but the pale colouration in the male of the former is as a rule slightly more extended, and Ethiopian specimens are as an average somewhat larger.

20. **Musca (Eumusca) fletcheri** Patton and Senior White.

1924. ! *Musca fletcheri* Patton and Senior White, *Rec. Ind. Mus.* **XXVI**, 574, Figs. 21, 49; Patton, 1937, *Ann. trop. Med. Paras.*, **XXXI**, 200. Types: Andhra Pradesh: Samalkota; Shencottah; Pusa; paratypes in B.M. and Liverpool School Trop. Med.

Head: Eyes bare, separated in male by $\frac{1}{6}$–$\frac{1}{8}$ head-width, interfrontalia fuscous-black, often somewhat reddish in front, parafrontalia linear at middle, very slightly wider behind, conspicuously wider in front; in female vertex more than a third (0·36) head-width, interfrontalia at least twice as wide at middle as a parafrontale, the latter only slightly more thinly dusted on upper fourth, with rather weak inclinate setae and 2–3 rows of black proclinate setulae, the 3–4 upper orbitals only slightly longer. *Thorax* rather thickly dusted silver-grey with four broad undusted black vittae, the inner ones suddenly becoming slightly wider at suture, dust between and especially along the vittae usually somewhat brownish; 1 *acr*, only the last two *post dc* strong, the anterior *post dc* very small or indistinct, the *post dc* distinct but weak. Pleural setae normal; propleural depression bare; anterior end of suprasquamal ridge with a few or without black setulae. *Abdomen* of male largely brownish-yellow, first segment piceous-black except for a rather broad pale hind margin on each side, fourth segment and often median part of second and third suffusedly infuscate, second in posterior view with a rather narrow well-defined black median vitta, third with or without a linear one; in female similar, largely and suffusedly infuscate on apical and median parts, lateral basal part dull yellowish-brown, median vitta narrower; pollinosity covering almost the whole abdomen except base and median vitta on second segment, but on each side with a conspicuous elongate shifting dark spot. *Wings* with light brown veins and wholly hairy membrane; stem-vein with 3–5 bristles on posterior side of dorsal surface; setulae on r_{4+5} normally reaching about level of *m-m*. Lower

calyptra whitish-grey. *Legs:* Fore tibia without a *pv* seta, mid tibia without an *av* or *ad* seta.

Length.—6·5–7·7 mm., of wings 5·8–6·8 mm.

Distribution.—CEYLON. S. INDIA (Samalkota, E. Coast; Artham, Visakhapatnam Distr.; Shencottah, Western Ghats). ASSAM (Silchar). MALAYA. SIAM. LAOS.

Biology.—Found on cattle and believed to be a blood-sucker, though this has not been proved.

21. **Musca (Eumusca) villeneuvei** Patton.

1922. *Musca villeneuvii* (*sic*) Patton, *Ind. J. med. Res.*, **X**, 74. Types: Nilambur, S. India, Liverpool School Trop. Med. 1923, *Phil. J. Sci.*, **XXXIII**, 332; Patton and Senior White, 1924, *Rec. Ind. Mus.*, **XXVI**, 569, Figs. 11, 38; Patton, 1937, *Ann. trop. Med. Paras.*, **XXXI**, 136.

Head: Eyes bare, approximated in male ; separated by a quarter head-width in female, where the parafrontalia are less than half width of interfrontalia, shining black on upper fourth, silver-dusted on anterior half, and rather thinly brown-dusted on intermediate half, proclinate setulae black, rather strong, in about two irregular rows, upper orbitals hardly stronger. *Thorax* with a pair of broad glossy black vittae, the vittae of each side being completely fused though a vestige of a greyish vitta over the *prst dc* may be visible in a posterior view; scutellum with a conspicuous black median vitta and the usual spot on lateral surface; dorsal surface otherwise rather densely dusted bluish-grey to cinereous-grey; 1 *acr*, 2–3+c.5 *dc*, the anterior *post dc* rather weak. Pleural setae normal; anterior end of suprasquamal ridge with a group of short but rather strong black setulae. *Abdomen* brownish-orange, somewhat darker in female, basal excavation of first segment, a suffused moderately broad median vitta, which is dilated towards hind and front margins, and the latter fuscous; in a more strictly posterior view the pale pollinosity reduces this median vitta to a well-defined moderately narrow black one on the second, a narrow one on the third and a linear one on the fourth segment. *Wings* with light brown veins and wholly hairy membrane; stem-vein with 3–4 bristles on posterior side of dorsal surface; setulae on r_{4+5} extending to about level of *m-m.* Lower calyptra somewhat browned. *Legs:* Fore tibia without a *pv* seta, mid tibia without an *av* or *ad* seta.

Length.—6·7 mm. of wings 5·8 mm.

Distribution.—S. INDIA (Kerala; Nilambur; Madras; Ootacamund; Nedungadu).

Biology.—The typical specimens were bred from pupae found near elephant dung. The puparium is 'white' according to Patton.

Subgenus **Viviparomusca** Townsend.

Taxonomically this subgenus is very well defined by the presence of setulose hairs on posterior part of suprasquamal ridge and at the same time the absence of such hairs from the disc of the lower calyptra. The propleural depression is bare, the setulae on r_{4+5} extend well beyond *r-m* and the anterior end of the suprasquamal ridge bears a tuft of

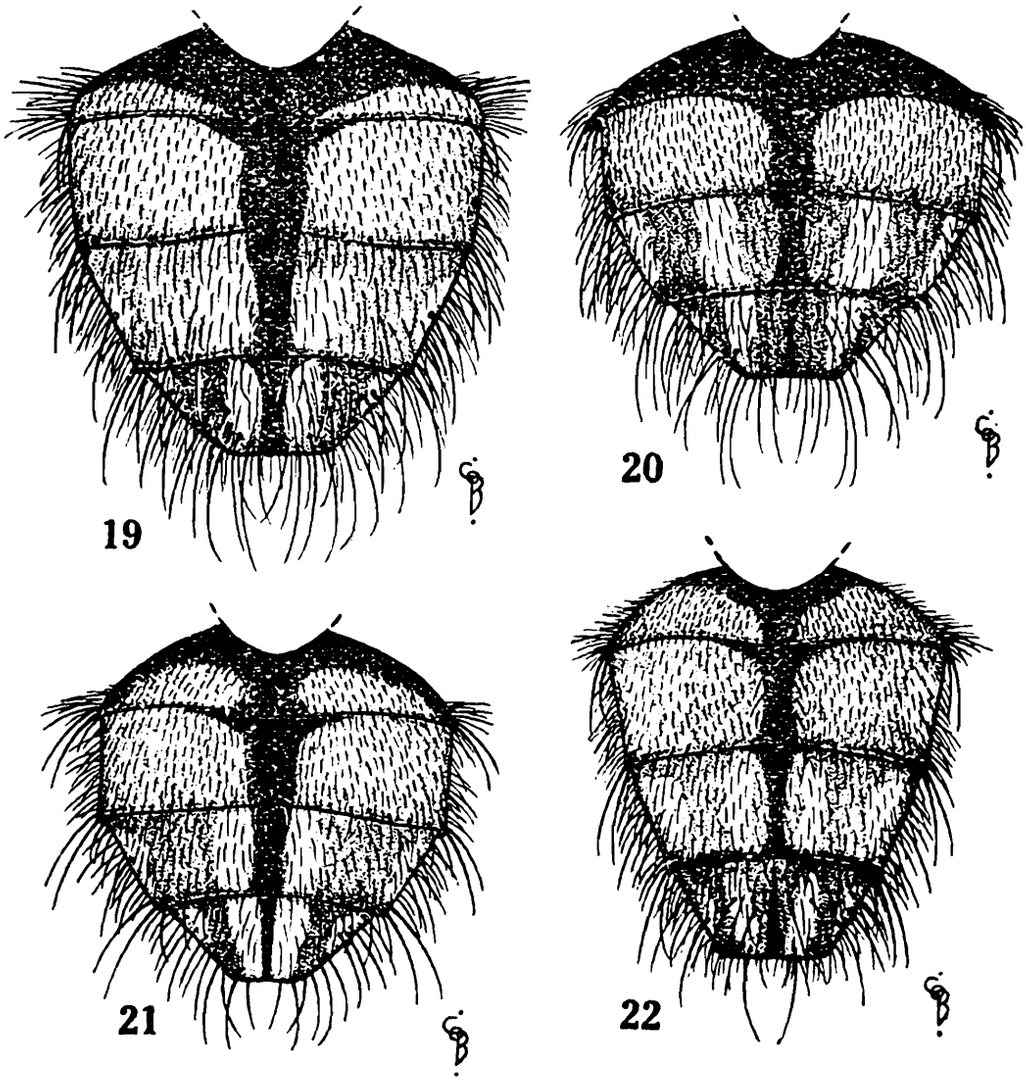


FIG. 19. *Musca* (*Viviparomusca*) *bezzii* P. and C., dorsal view of male abdomen.

FIG. 20. *Musca* (*Viviparomusca*) *bakeri illingworthi* Patton, dorsal view of male abdomen.

FIG. 21. *Musca* (*Viviparomusca*) *gibsoni* P. and C., dorsal view of male abdomen.

FIG. 22. *Musca* (*Viviparomusca*) *formosana* Mall., dorsal view of male abdomen.

setulae as in subgenus *Eumusca*. Biologically, however, the group is perhaps not as clearly separated as the name would suggest, as *M. gibsoni* has been described by Patton and Cragg (1913) as laying pedicelled eggs. It is quite possible that the authors dealt with a mixed material, and that the true *gibsoni* will prove to be viviparous. On the other hand *M.* (*Byomyia*) *planiceps* is known to be viviparous, so an exception in subgenus *Viviparomusca* cannot be excluded from the possibilities.

Distribution.—PALAEARCTIC, ETHIOPIAN and ORIENTAL REGIONS.

22. Musca (Viviparomusca) bezzii Patton and Cragg.

(Figs. 10*e*, 11*a*, 12, 19)

1913. *Musca bezzii* P. and C., *Ind. J. med. Res.*, **I**, 19, Pl. IV; 1913, *Textbook med. Ent.*, 352, Pl. XLV, Fig. 2, Pl. XXX, Fig. 2, 140; Patton, 1922, *Ind. J. med. Res.*, **IX**, 130 (biting habits), 232, Pl. XVII (*Herpetomonas*); 1922, *Bull. Ent. Res.*, **XII**, 421; 1923, *Phil. J. Sci.*, **XXIII**, 334; Patton and Senior White, 1924, *Rec. Ind. Mus.*, **XXVI**, 573, Figs. 20, 48; Patton and Evans, 1929, *Insects, Ticks, etc.*, 394, Fig. 227A (♀ genitalia); Patton, 1937, *Ann. trop. Med. Paras.*, **XXXI**, 204 (♀ genitalia); Ho, 1938, *Ann. trop. Med. Paras.*, **XXXII**, 289, Figs. 1C (larva), 5, 7 (♀ genitalia); Muirhead Thomson, 1947, *Proc. R. ent. Soc., Lond.* (A), **XXII**, 93, Figs. 8–13 (larva). Types: Kodaikanal; Kotagiri. Indian Mus., Calcutta, paratypes in Liverpool School Trop. Med.

1916. *Musca pilosa* Awati, *Ind. J. med. Res.*, **IV**, 137; 1917, *l.c.*, V, 165 (*bezzii*). Types: India.

Head: Eyes with sparse and short but rather distinct hairs, in male contiguous, interfrontalia spindle-shaped in anterior, linear in posterior half, parafrontalia linear, except in front; in female the vertex about a quarter head-width or a little more, interfrontalia at middle almost twice as wide as a parafrontale, proclinate setulae in about three irregular rows, upper orbitals indistinct. *Thorax* rather densely dusted whitish to cinereous-grey with four broad (especially in male) black vittae, the pollinosity brownish on disc, especially in male and between the vittae of each side; scutellum with a broad black median vitta and the usual spots on lateral surface; 1 *acr*, 2+4 strong *dc*; pleural setae normal; both anterior and posterior parts of suprasquamal ridge with a tuft of black setulae. *Abdomen* of female wholly fuscous-black with a glossy black rather narrow median vitta and on the intermediate segments on either side two large golden-grey dusted spots, fourth segment wholly

pale dusted with 3–4 shifting dark vittae; in male (Fig. 19) first segment piceous-black with a narrow pale orange hind margin on each side, the dark median colouration as a rule broadly reaching hind margin; segments 2–4 orange with a piceous-black median vitta, which is strongly broadened at base of second segment, otherwise parallel-sided and as a rule very slightly narrowed at hind margin, third segment with a moderately narrow parallel-sided median vitta, fourth with a narrow tapering one, pale dust as in female, but less conspicuous and less extended on second segment. *Wings* with brown to light brown veins and pale wholly haired membrane ; stem-vein with 4–7 bristles on posterior side of upper surface, setulae on under side of r_{4+5} more or less reaching level of *m-m*. Lower calyptra whitish-grey, slightly smoky, especially in male. *Legs:* Fore tibia without a *pv*, mid tibia without an *av* and *ad* seta.

Length.—6·3–9·4 mm., of wings 5·7–7·8 mm.

Distribution.—INDIA: S. India (Nilgiri Hills: Coonoor; Cherangote, 3,500 ft.; Kotagiri; Kodaikanal; [Former] Portuguese India). N. India, Kashmir (Nagin, Dal Lake). (U.P. (Uttar Pradesh) nr. Naini Tal; Mussoorie; Punjab; Kasauli; Kulu) and Assam (Shillong). SIKKIM (Mungpoo, 2,200 ft.). BURMA. Widely distributed at altitudes of 1,500 ft. and above. Apparently mutually exclusive (' vicariant') with *bakeri* Patt. The distinguishing characters are rather slight, and both *bakeri* Patton and *illingworthi* Patton are, in my opinion, only subspecies of the present form. Patton distinguished them from *formosana* (his *greeni*) mainly by bare eyes but specimens of *bezzii* named thus by Patton show the hairs at least as clearly as specimens of *formosana*, which Patton did not distinguish from them prior to 1933.

Biology.—Found on and around animals, purely haematophagous (Patton). Larviparous, a single first-stage larva being deposited at a time in cow-dung. Puparium light reddish-brown. The larva was described by Muirhead Thomson, who found it and its biology identical with those obtained from adults named by me (apparently wrongly) *illingworthi*.

23. Musca (Viviparomusca) bakeri illingworthi Patton.

(Fig. 20)

1923. *Musca illingworthi* Patton, *Phil. J. Sci.*, **XXIII**, 323 ; Patton and Senior White, 1924, *Rec. Ind. Mus.*, **XXVI**, 572, Figs. 17, 44; Patton, 1937, *Ann. trop. Med. Paras.*,

XXXI, 199, Fig. 12. Type: Buitenzorg, Java. Bishop Mus., Honolulu.

1925. *Musca* (*Viviparomusca*) *planiceps* Wied. of Malloch, *Ann. Mag. n. H.* (9), **XVI**, 375 (nec Wied.); 1926, *l.c.* (9), **XVII**, 489.

Head: Eyes virtually bare; in male contiguous, interfrontalia obsolete above middle, very narrow in front, parafrontalia linear behind, less wide in front than third antennal segment; in female vertex somewhat more than a quarter head-width, interfrontalia at middle 1·5–2 times as wide as a parafrontale, the latter with moderately strong not very long inclinate setae and with 2–3 irregular rows of black proclinate setulae, 5–6 on the upper half slightly longer and somewhat bent outwards, wholly and rather densely dusted grey. *Thorax* rather densely dusted silver-grey, with four broad black vittae, in male the pollinosity thinner behind where the vittae become less conspicuous, scutellum with a large suffused black median spot and the usual dark spot on lateral surface; 1 *acr*, 2+4 *dc*, the anterior 2 *post* ones weak; pleural setae normal; suprasquamal ridge with a tuft of black erect setulae both anteriorly and posteriorly. *Abdomen* wholly fuscous-black in female, second and third segments each with two pairs of large silver-grey spots, which leave a black median vitta shaped as in male, fourth dusted silver-grey with three dark shifting vittae; in male (Fig. 20) first segment piceous-black with or without a narrow light brown hind margin on each side, second and third light brown-yellow with a moderately narrow median vitta which is slightly dilated towards fore margin, extending, however, a third to halfway along it, and which is slightly more strongly dilated to hind margin without, however, being produced along it; third segment with a narrow black median vitta, which is slightly widened from middle to posterior fourth and slightly narrowed from there to hind margin; fourth segment usually darkened (post-mortem?) with three shifting dark vittae as in female. *Wings* with brown veins and wholly hairy membrane; stem-vein with 3 (–5) rather long bristles, setulae on underside of r_{4+5} extending to about level of *m-m*. Lower calyptra greyish, in male somewhat smoky. *Legs:* Fore tibia without a *pv* seta, mid tibia without an *av* or *ad* seta.

Length.—6·7–9·5 mm., of wings 5·7–7·8 mm.

Distribution.—MALAYA. INDONESIA (up to Lombok and Celebes). COCHIN CHINA. W. CHINA (Singling, Prov. Shen-Se). Records by Patton and Senior White and (on the strength of an older identification by myself) Muirhead

Thomson from N.E. Assam and Calcutta are obviously based on misidentifications, and Patton (1937) states that the distribution extends from Malaya to the Philippines. Connected with *bakeri* Patton (1923, *Phil. J. Sci.*, **XXXIII**, 316) by every transition in the colouration of the ventrites and undoubtedly only a subspecies of that species, which occurs on the Philippine Islands (Luzon; Negros). Specimens from Siam (Biserat) in the B.M. are indistinguishable from *bakeri*. Patton describes the female as having the abdomen largely pale, but his females may have belonged to a different species.

Biology.—Haematophagous, on and about cattle and cow-dung, in which latter the larvae are found. The empty puparium is light brown, darker than that of *formosana*, and paler than that of *gibsoni*, less reddish-brown than that of *bezzii* P. and C.

24. **Musca (Viviparomusca) gibsoni** Patton and Cragg.

(Fig. 21)

1913. *Musca gibsoni* P. and C., *Ind. J. med. Res.*, **I**, 14, Pl. I; 1913, *Textbook med. Ent.*, 350, Pl. XLVI, Fig. 10 (larva); Patton, 1923, *Phil. J. Sci.*, **XXIII**, 333; Patton and Senior White, 1924, *Rec. Ind. Mus.*, **XXVI**, 570, Figs. 12, 40; Patton, 1937, *Ann. trop. Med. Paras.*, **XXXI**, 138, Figs. 7, 8*a*. Type: Kodaikanal. Indian Mus., Calcutta, paratypes Liverpool School Trop. Med. and B.M.
Musca pattoni Austen of Patton, in B.M. (Austen pars.).

Head: Eyes distinctly hairy, hairs in male often longer than basal diameter of arista; eyes of male subcontiguous, separated by half to almost full width of third antennal segment, interfrontalia narrow to linear behind middle, about as wide as third antennal segment in front, parafrontalia linear, except in front; in female vertex more than a quarter to fully three-tenths head-width, interfrontalia nearly thrice as wide at middle as a parafrontale, on the latter 2–3 rows of proclinate black setulae, 3–4 upper orbitals slightly stronger. *Thorax* rather densely dusted whitish-grey with four moderately broad black vittae, the dust on disc and especially between the vittae of each side usually somewhat brownish or cinereous; scutellum with a complete or incomplete dark median vitta and a basal spot on lateral surface; 1 *acr*, 2+4–5 *dc*, the anterior 2–3 *post dc* weaker, pleural setae normal; suprasquamal ridge with a tuft of

black erect setulae in front and numerous erect black hairs behind. *Abdomen* (Fig. 21) brownish-yellow (♂ ♀) with the basal declivity and a median vitta piceous-black, the basal colouration extends as a rule somewhat to dorsal surface of first segment, and the median vitta of the first segment is often interrupted, or present only at base or hind margin, it is narrowest on disc and somewhat dilated to hind margin of segment, in female often the entire hind margin piceous; on second segment the median vitta dilated at base and in male usually slightly dilated at hind margin, in female strongly dilated so as to form a complete broad dark hind margin; third segment in male with a narrow piceous median vitta and sometimes the hind margin infuscate, in female largely fuscous with the anterior angles pale translucent, the intermediate segments in posterior view each with two pairs of large silver to golden-grey dusted spots, which cause to stand out in both sexes a moderately narrow piceous undusted median vitta on the second and a narrow one on the third; fourth segment largely infuscate, with or without an undusted linear piceous-black vitta, the reflections changing at median line, so that on one side a moderately broad pale dusted and on the other a dull vitta of the same width is visible, basal angles broadly pale dusted. *Wings* with light brown veins and wholly hairy membrane; stem-vein with 1–3 bristles on posterior side of dorsal surface; under side of r_{4+5} with conspicuous setulae to about bend of *m-m*. Lower calyptra whitish-grey, often slightly smoky, especially in male. *Legs:* Fore tibia without a *pv*, mid tibia without an *av* or *ad* seta.

Length.—4·5–7·3 mm., of wings 4·8–6·9 mm.

Distribution.—CEYLON. INDIA (Palni Hills; Nilgiri Hills; Darjeeling; Calcutta; Assam). BURMA (Rangoon). MALAYA. FORMOSA.

Biology.—An oviparous '*Viviparomusca*' according to Patton and Cragg, laying stalked eggs singly on patches of cow-dung, the stalk 'directed uppermost' Haematophagous, on and about animals and cow-dung. Puparium brown (but not rufous-brown).

Awati's *M. lati-parafrons* has no setulae on the supra-squamal ridge, and he (1917, *Ind. J med. Res.*, V, 173) and Patton were therefore wrong in synonymizing it with the present species, the identification of which by Patton was apparently always somewhat uncertain.

25. Musca (Viviparomusca) formosana Malloch.

(Fig. 22)

1910. *Musca pattoni* Austen, *Ann. Mag. n. H.* (8), V, 114 (pars).
1925. *Musca* (*Viviparomusca*) *formosana* Mall., *Ann. Mag. n. H.* (9), XVI, 375. Types: Formosa; Szechuan.
1933. *Musca greeni* Patton, *Ann. Trop. Med. Paras.*, XXVII, 477; 1937, *ibid.*, XXXI, 206. Types: Kuala Lumpur; Silchar, Assam. (n. syn.)

Head: Eyes with sparse minute hairs, which are rather distinct in male, though hardly a third the length of the aristal diameter; in male virtually contiguous, interfrontalia obsolete or linear behind middle, narrow in front, parafrontalia almost linear except in front; in female vertex slightly over a quarter head-width, interfrontalia at middle one-and-a-half times as wide as a parafrontale, somewhat narrowed in front and behind, parafrontalia densely dusted silver-grey, the dust slightly thinner behind, the proclinate black setulae in 2–3 irregular rows. *Thorax* rather thickly dusted silver-grey, dust somewhat thinner between the four moderately broad undusted black vittae; scutellum with dark median vitta and lateral spots; 1 *acr*, 2+4(–5) *dc*, pleural setae normal. Suprasquamal ridge with erect black setulae in front and erect black hairs behind. *Abdomen* (Fig. 22) brown-yellow, in female somewhat darker, basal excavation and a narrow median vitta on second and third segments, in male usually, in female seldom, connected with dark colouration of excavation, piceous-black; fourth segment of male usually infuscate along median line, of female usually broadly infuscate, the dark colouration of the female sometimes extending from apical and median parts over most of abdomen; two pairs of pale golden-dusted spots on intermediate segments emphasizing the dark median vitta, fourth segment wholly pale dusted, with shifting vittae and spots. *Wings* with light brown veins and wholly hairy membrane; stem-vein with 4–6, less often 3 or 7, bristles on posterior side of dorsal surface; setulae on r_{4+5} reaching about level of *m-m*. Lower calyptra whitish grey, very slightly smoky, especially in male. *Legs:* Fore tibia without a *pv* seta, mid tibia without an *av* or *ad* seta.

Length.—6·7–8·6 mm., of wings 5·8–7·6 mm. (Siamese specimens up to 9·0 and 8·2 mm. respectively).

Distribution.—CEYLON (including paratypes of *pattoni*). INDIA (Walayar Forests, S. Malabar; Nilgiri Hills; Visakha-

patnam Dist.; Meerut, U.P.; Pusa, Bihar; Calcutta). MALAYA (Kuala Lumpur, Port Sinham; Negri Sembilan; Mt. Ophir). SIAM (Chantaburi; Nong Taro). S. CHINA (Canton). FORMOSA.

Biology.—Haematophagous, on and about animals, especially cattle in the field. Adults have also been collected on cow-dung in the open field and on excreta of mealy bug. Larvae in cow-dung. Puparium whitish brown.

Owing to a misidentification of *M. planiceps* (*see* Malloch, 1926, *Ann. Mag. n. H.* (9), **XVII**, 489), which name apparently referred to *M. illingworthi*, the present species was described as closely related to the former, and Patton has therefore interpreted a form of *planiceps* Wied. as *formosana* Mall., whilst he named the present form '*greeni*' and sometimes '*bezzii*'

Subgenus **Ptilolepis** Bezzi.

Agreeing with subgenus *Viviparomusca* in the presence of numerous erect setulose hairs on both posterior and anterior parts of suprasquamal ridge, but differing from that subgenus by the presence of black erect setulose hairs on inner dorsal part of lower calyptra. Propleural depression bare.

Distribution.—Restricted to the ORIENTAL REGION.

26. **Musca (Ptilolepis) inferior** Stein.

1909. *Musca inferior* Stein, *Tijdschr. Ent.*, **LII**, 213; 1918, *Ann. Mus. Hungar*, **XVI**, 149; 1919, *Tijdschr. Ent.*, **LXII**, 40, 47; Patton, 1922, *Bull. ent. Res.*, **XII**, 422; 1923, *Phil. J. Sci.*, **XXIII**, 319; Patton and Senior White, 1924, *Rec. Ind. Mus.*, **XXVI**, 576, Figs. 25, 53; Patton, 1937, *Ann. trop. Med. Paras.*, **XXXI**, 207; Ho, 1938, *ibid.*, **XXXII**, 305, Figs. 1B, 8B, 12H. Types: Semarang; Buitenzorg; Batavia. Mus. Amsterdam.

1912. *Philaematomyia gurneyi* Patton and Cragg, *Ann. trop. Med. Paras.*, V, 513 (*gurnei*); 1913, *Ind. J. med. Res.*, **I**, 28, Pl. VII; 1913, *Textbook med. Ent.*, 356, Pl. 47, Fig. 2, Pl. 9, Fig. 7 (proboscis), Fig. 49 (mouth-parts); Cragg, 1913, *Sci. Mem. Officers med. san. Depts. India*, **LX**, 23 (proboscis); Castellani and Chalmers, 1913, *Man. trop. Med.*, 709; Awati, 1918, *Ind. J. med. Res.*, V, 538, Pls. 50, 51, 54. Types: Guindy; Kodaikanal. Indian Museum, Calcutta.

1916. *Philaematomyia inferior* Stein, Bezzi, *Phil. Bur. Sci. Publ.*, **X**, 29 (= 1917, *Phil. J. Sci.*, **XII** (D), 130); Banks, 1919, *ibid.*, **XIV** (D), 187.

1921. *Ptilolepis inferior* Stein, Bezzi, *Ann. trop. Med. Paras.*, **XIV**, 333; Malloch, 1925, *Ann. Mag. n. H.* (9), **XVI**, 377; Hennig, 1952, *Beitr. Ent.*, **II**, 92.

Head: Eyes bare, in male separated by a tenth head-width, interfrontalia rather narrow, almost parallel-sided, parafrontalia almost linear behind middle, slightly wider behind where they are thinly dusted brown and appear black, more strongly widened in anterior half where they are densely dusted pale grey, on upper half lateral to the inclinate setae a row of fine proclinate setae; vertex of female about a third head-width, interfrontalia 1·5–2 times width of a parafrontale at middle, almost parallel-sided, outward to the inclinate setae 2–3 rows of proclinate black setulae, among them 4–5 upper orbitals rather distinct. Proboscis stout, mentum about two-and-a-half times width of third antennal segment. Palpi dull brownish-orange with darker tip in male, orange in female. *Thorax* rather thickly dusted whitish-grey with four rather broad black vittae, which are thinly dusted dark brown; scutellum in posterior view with a dark apical spot, which may extend to base; 1 *acr*, only the last pair of *dc* strong and one pair close to them well developed, the others very small or indistinct, dorso-lateral and pleural setae normal, hair of dorsal surface fine, dense, even and unusually short. *Abdomen* fuscous, in male suffusedly dull light brown on lateral anterior part of intermediate segments, intermediate segments each with two pairs of very large silver or pale golden-grey dusted spots, second with a narrow, third with a very narrow, fourth with or without a linear black median vitta, fourth segment, otherwise wholly dusted, with three to four shifting dark vittae. *Wings* with brown veins and wholly hairy membrane; stem-vein with 3–5 bristles on posterior side of dorsal surface, r_{4+5} setulose to about level of *m-m*. Lower calyptra whitish-grey, markedly smoky in male, anterior part and disc with numerous erect black hairs. *Legs:* Fore tibia without a *pv* seta, mid tibia without an *ad* but often on apical half with a few small *av* setae.

Length.—5·7–8·8 mm., of wings 5·4–7·5 mm.

Distribution.—CEYLON. INDIA (Palni Hills; Nilgiri Hills; many places in Bengal; Assam; Andaman Isl.). BURMA (Rangoon). MALAYA. INDONESIA (up to Flores). PHILIPPINES. FORMOSA. S. CHINA (Hainan). ANNAM. SIAM.

Biology.—On animals (cattle and horses), drawing blood by scratching their skin with its prestomal teeth. Larva in cow-dung; the species is oviparous, the egg being stalked and 3·5 mm. long, including the stalk. The earlier instars of the larva have been described by Muirhead Thomson (1947, *Proc. R. ent. Soc. Lond.* (A), **XXII**, 91) and the third by Siddons and Roy (1940, *Ind. J Med. Res.*, **XXVII**, 819).

Subgenus **Setimusca** n.

Suprasquamal ridge with a tuft of black setulae at anterior end but without setulae posteriorly, at the same time lower calyptra with black erect setulose hairs on inner part of dorsal surface. Eyes densely long-haired; parafacialia densely setulose. Propleural depression bare.

Although this subgenus tallies with subgenus *Ptilolepis* in the presence of hairs on lower calyptra and anterior end of suprasquamal ridge, it differs greatly from this and all other *Musca* by the hairy parafacialia. The densely hairy eyes, normal proboscis and strong *dc* also remove it considerably from *Ptilolepis*, and the absence of hairs from posterior part of suprasquamal ridge proves that it is of entirely different phylogenetic origin, tracing back to *Eumusca*-like forms, whilst subgenus *Ptilolepis* is derived from *Viviparomusca* stock.

Distribution.—Only known from N.E. BURMA. Genotype *M. malaisei* sp. n.

27. **Musca (Setimusca) malaisei** sp. n.

♂ ♀ : *Head:* Eyes densely long-haired, the hairs in male as long as width of third antennal segment, in female fully half that length; eyes of male contiguous, interfrontalia obsolete at and behind middle, of width of antenna anteriorly, parafrontalia linear and black on dorsal half, dilated, dusted silver-grey and with dense rather long half-erect black hairs on anterior half, these hairs continued to lower end of parafacialia; vertex of female slightly over a quarter head-width, interfrontalia twice as wide as a parafrontale at middle, hairy at sides, slightly narrowed anteriorly, more strongly posteriorly, parafrontalia and parafacialia haired as in male, hairs on the former extending to vertex, with the upper orbitals rather indistinct. Proboscis normal, palpi fuscous-black. *Thorax* moderately thickly dusted silver-white with four rather broad black vittae, which are overlaid with some dust, the space between the vittae more or less dusted brownish, except less or hardly so anteriorly and medially; scutellum in posterior view with a dark median and basal lateral spot; 1 *acr*, 2+4 strong *dc*; pleural setae normal, but anterior mesopleural, prostigmal and propleural rather thin. *Abdomen* rather short and broad, fuscous-black; in male the lateral third or a little more (of the whole width) pale brownish-yellow, first segment wholly dark except for lateral part of hind margin, on the intermediate segments the broad

dark median vitta dilated to fore margin of second and hind margin of third and, to a lesser extent, to boundary between the two segments, fourth segment wholly fuscous; both sexes on each of the intermediate segments with two pairs of moderately large pale golden or dusted golden-grey spots, the inner ones in male overlying part of the dark vitta, second segment thus in posterior view with only a narrow black median vitta and a black hind margin, in female with another fuscous vitta towards lateral part, third segment similar, fourth wholly dusted with shifting dark vittae. Ventrites fuscous-black (♂ ♀), ventral margins of tergites in male pale orange. *Wings* with brown veins and wholly haired membrane; stem-vein with 3–5 bristles on posterior side of dorsal surface; setulae on underside of r_{4+5} extending to about level of *m-m*. Lower calyptra smoky-grey, more strongly so in male; inner part of dorsal surface with erect black hairs as in *M inferior*. *Legs* normal, fore tibia without a *pv* seta, mid tibia without an *av* or *ad* seta.

Length.—5·2–7·7 mm., of wings 5·1–7·0 mm.

Distribution.—N.E. BURMA: Kambaiti, 7,000 ft., 6.IV.–7 VI.43 (*R. Malaise*), ♂ type, 40 ♂, 132 ♀ paratypes. Type in Riksmuseum Stockholm, paratypes in British Museum and Zool. Museum, Helsinki.

Genus 2. **Morellia** Robineau-Desvoidy.

1830. *Morellia* Robineau-Desvoidy, *Myod.*, 405. Genotype: *hortorum* Fln.

Head: Eyes more or less approximated in male, more or less widely separated in female; facial ridges with decumbent setulae on more than lower half, vibrissae at mouth-margin; arista plumose, the rays quickly becoming shorter from middle to apex, the outline of the latter therefore forming a sharp angle. Ocellars and outer verticals small or indistinct in male, well developed in female; inner verticals strong. *Thorax* with 1–0+0–2 *acr*, the *prst* one weak, if present, 0–3+1–5 *dc*, the anterior ones sometimes indistinct, 1 (in *viridaurea* 0) *post ia*, usually 3 humerals, 0–2 posthumerals, 1 *prst* (missing in *viridaurea*), 0–1 *pra*, 1–2 *sa*, 2–3 postalars, the third (innermost) slightly in front of postalar callosity, 2 *npl*; propleural depression bare (except in *chrysomyzina*), propleural(s) distinct, prostigmal absent or indistinct among the adjacent long setulose hairs; anterior mesopleural represented by 2–4 setulae (in *viridaurea* absent); upper part of pteropleura setulose; suprasquamal ridge without setulae; *stpl* 1–1–1, hypopleura with one or several setulae on upper

anterior embossed part, except in the *ophyroides* group. *Abdomen* not or little longer than wide, wholly dark in Oriental species, without distinct median marginal setae and, on anterior three segments, without discals; male hypopygium inconspicuous. *Wings* hyaline, r_1 bare, *m* broadly rounded forward and shallowly sinuous towards apex, R_5 not or not much wider at apex than at base. Basicosta fuscous. Subcostal sclerite and stem-vein without setulae; calyptrae without black setulose hairs on disc. *Legs* fuscous-black; fore tibia in Oriental species without a submedian *pv* seta (but see *hortorum* ♂); mid tibia without a submedian *av* seta, usually with several *p* setae, 1–2 of which assume a *pv* position in a few Oriental species.

Flies from 4–10 mm. in length, black or metallic, usually with conspicuous pollinosity, especially at shoulders and on median vitta of mesonotum, distinguished from Oriental *Musca* by the broadly rounded bend of *m*, the dark basicosta and the pointed outline of the arista.

Distribution.—A few species in the PALAEARCTIC and NEARCTIC REGIONS and about a dozen in each of the NEOTROPIC, ETHIOPIAN and ORIENTAL REGIONS. The only described Australian species *M. indecora* Walk. is a *Passeromyia* (n. comb.).

Biology.—The eggs are similar to those of *Musca*. They are stalked in some species and are deposited in batches or singly on dung; the larvae are dung feeders (Hammer, 1941, Thomson, 1947). Adults of Oriental species were found on flowers, hedges, on cattle and horses, on dung, but also repeatedly on windows, so some species may be objectionable from the point of hygiene.

Key to the species of Morellia

1 (10) Prosternal sclerite strongly dilated anteriorly, broadly triangular, displacing the membranous part, its anterior margin contiguous with propleura; setulose. Body metallic.

2 (7) Thorax without silver-white dust, at most with slight brownish dust. Mid tibia without a seta in a distinctly *pv* position.

3 (4) Discal cell wholly haired. *prst dc* and *acr* distinct. Purplish steel blue. Jowls dusted conspicuously, though not thickly. . . . . *ophyroides* sp. n., p. 97

4 (3) Discal cell wholly bare (Fig. 23). *prst dc* and *acr* absent.

5 (6) Femora fuscous black, without distinct metallic reflections. Apical

half of wing haired, *m-m* only slightly oblique (Fig. 23). *post ia* and *prst* well developed. Metallic blue with purple reflections — *chrysomyzina* sp. n., p. 98

6 (8) Femora bright metallic green. Only hind margin of wing (Fig. 24) haired, R_1 and R_3 thus wholly bare, R_5 bare to apex in anterior part; *m-m* strongly oblique, the posterior distal angle c.120°. *post ia* and *prst* absent. Bright metallic green — *viridaurea* sp. n., p. 100

7 (2) Thorax with silver-white dust anteriorly on a median vitta and on the shoulders. Mid tibia with a *pv* seta at apical third. Jowls dusted conspicuously, though not thickly. Metallic blue with purple reflections or green.

8 (9) Discal cell devoid of hairs (♀) or at least bare on basal half and along fourth and fifth veins (♂), R_5 bare in basal part (Fig. 25). Lower calyptra whitish (♀) or browned (♂). ♀: Interfrontalia at middle hardly twice width of a parafrontale . . . . . — *albisquama* sp. n., p. 101

9 (8) Discal cell largely haired, R_5 wholly haired. Lower calyptra dark brown. ♀: Interfrontalia at middle almost thrice width of a parafrontale. — *brunneisquama* sp. n., p. 102

10 (1) Prosternal plate not or only slightly dilated anteriorly, separated from propleura by a conspicuous membrane, parallel-sided to ovate. Body without marked metallic reflections, at most slightly brassy in places, mesonotum always with conspicuous dust, especially in front, which encloses two or four broad undusted vittae.

11 (14) Prosternum bare. 3 strong and subequal or no distinct *prst dc.* The transverse row of pre-apicals of the mid femora continued from *p* and *pd* surfaces to the *d* and *a* surfaces (Fig. 26). ♂: Mid knee with secondary sexual characters (Fig. 26). *ad* surface of mid femur abruptly lower apicad of the row of pre-apicals, so that the setae appear to stand on a slight callosity; base of tibia with very short, stout, erect black setulae on *ad* surface.

12 (13) 3 strong and subequal *prst dc*. Discal cell wholly haired. 8–9 mm. ♂: Fore tibia with dense black setulose hairs on *v* surface and with a row of long strong *pv* setae, the longest of which are more than thrice length of tibial diameter; fore femur with dense long erect hairs on *v* surface, among which the row of long *pv* setae is not very conspicuous — *hortorum cashmirana* ssp. n., p. 104

13 (12) *prst dc* hair-like, hardly longer than the hairs. Discal cell bare except for a patch of hairs on apical third. 6–7 mm. ♂: Fore tibia without distinctive hairs; fore femur with only a few longish *p* hairs on basal two-thirds, but the apical 4–6 *pv* setae inserted each on a tubercle, stout, flattened and somewhat dilated to apex, rather oar-shaped. — *quadriremis* sp. n., p. 105

14 (11) Prosternum with black setulae on lateral margins. Pre-apical setae of mid femur continued only to *pd* and *d* surfaces. ♂: Mid knee without secondary sexual characters.

15 (18) Lower calyptra brown, border and fringe often somewhat paler. Intermediate abdominal segments evenly and somewhat thinly dusted grey, with a narrow black median vitta but without shifting spots, pollinosity often thinner towards hind margin (Fig. 27). Thorax in posterior view distinctly somewhat grey-dusted on the line of the *dc*, the two black vittae thus more or less divided into four. Scutellum in dorsal view glossy black and appearing undusted, in posterior view with some pale dust on a narrow indefinite vitta on either side. Wing membrane almost wholly haired, especially the discal cell without any hairless area. Hind tibia (♂ ♀) with 1 to about 7 *av* setae. ♂: The setulose hairs on *pv* surface of fore tibia fine, not or only slightly longer than tibial diameter; fore femora with a row of strong long *pv* setae, without any long hairs on *v* surface.

16 (17) Fourth tergite with the reflections of the pollinosity somewhat divided on median line, otherwise uniform except for a small dark spot

at base of lateral surface. Parafacialia and anterior third of parafrontalia evenly dusted, without shifting reflections. ♂: Hind tibia with 1–4 erect setulose hairs on apical fourth of *av* and *pv* surfaces, and some adjacent shorter hairs; *v* hair on basal half of hind tarsus stronger, half-erect, the longest hairs near base having about twice the length of the tarsal diameter — *sordidisquama* Stein, p. 107

17 (16) Fourth tergite with shifting vittae or spots (especially distinct in an almost lateral view). Parafacialia in certain lights sharply defined from parafrontalia, when the upper part of the former or the lower part of the latter is occupied by a spot of shifting dark reflections. ♂: Hind tibia with a row of 4–7 semi-erect *av* setae on apical half or more, and a triple row of fine erect *p*, *pv* and almost *v* setulae from shortly before middle to apical fourth; hair of hind tarsus normal, short and even — *nigrisquama* Mall., p. 108

18 (15) Lower calyptra whitish. Intermediate abdominal segments with conspicuous pollinosity and at least a pair of shifting spots or vittae (Fig. 28).

19 (24) Mid tibia with 1–2 strong *pv* setae, which compared with the row of decumbent hairs are markedly more *v* in position than the two *p* setae near base. Abdominal segments with elongate shifting spots, which form complete vittae at least on the third segment. Thorax with a pair of broad black vittae, which are not divided, no pale dust being present on the *dc* strip. Scutellum rather conspicuously dusted. Wing membrane often with bare areas on basal part, especially the basal part of the discal cell often with a bare spot or strip.

20 (23) Mid tibia with one *pv* seta (near apical third). Wing length less than 7 mm. . . . . — *hortensia* (Wied.), p. 108

21 (22) Discal cell bare on basal third or more, the bare area further extended apicad along fourth and especially fifth veins. ♀: Frons nar-

rowest near anterior ocellus, slightly dilated to lunula. . *hortensia hortulana* (Wied.), p. 110

22 (21) Discal cell wholly or almost wholly haired. Confirmed by Tuxen from type. ♀: Frons narrowest at anterior quarter, slightly narrowed from anterior ocellus towards lunula. *hortensia hortensia* (Wied.)

23 (20) Mid tibia with two strong *pv* setae, at middle and at apical fourth. Wing length more than 7 mm. Basal two-fifths or half of discal cell with a bare streak in the concave fold along the fifth vein.... *biseta* sp. n., p. 110

24 (19) Mid tibia without a *pv* seta (the strong seta or setae in question being almost exactly aligned by the rows of decumbent hairs with the two *p* setae on basal two-fifths). Abdominal segments rather evenly dusted on about basal half, the shifting spots, except for a black median vitta, thus largely confined to apical part, broad and seldom approaching base. Thorax with some grey dust on the *dc* strip, the black vittae thus more or less distinctly divided into four. Discal cell wholly haired. 3 well-developed *prst dc*.

25 (26) Wing length less than 7 mm. Setulae on basal part of r_{4+5} not or hardly extending beyond basal third of distance to *r-m*. The (3–)4–5 *av* setae of the hind tibia as a rule confined to apical half, rather close to each other, separated by about half their length. *pectinipes* sp. n., p. 112

26 (25) Wing length more than 7 mm. Setulae on r_{4+5} extending almost or fully halfway to *r-m*. The 5–6 *av* setae of the hind tibia extending well into basal half, rather widely spaced, the proximal 4–5 separated almost by their length. *affixa* Walk., p. 113

28. **Morellia ophyroides** sp. n.

♀: *Head* fuscous-black, frons inconspicuously dusted brownish, face, jowls and lunula rather thinly dusted grey, inner part of parafacialia undusted at level of second antennal segment. Eyes widely bare; frons almost three-tenths head-width at vertex, a trifle less at anterior fourth; frontal triangle

shagreened and not very shining, reaching middle; interfrontalia matt fuscous-black, strongly narrowed anteriorly, thrice width of a parafrontale at middle, parafrontalia with about 10 inclinate, 2 proclinate, and a short reclinate seta; between this and the proclinate setae 1–2 proclinate setulae; ocellars strong, inner verticals very strong, outer verticals hardly distinguishable from the larger inner setulae of the occipital row, parafacialia half, jowls one-and-a-half times as wide as third antennal segment. Antennae and palpi fuscous-black. *Thorax* purplish steel-blue, without any conspicuous pollinosity, the dorsolateral depressions, however, with thin brown-grey dust, and the disc in certain directions appearing thinly dusted brown; 1+1 *acr*, the *prst* ones less widely separated from each other than from the *dc*, 2+4 *dc*, other setae as in the generic description. *Abdomen* purplish steel-blue, without pollinosity, with decumbent hair, last segment in addition with dispersed long fine discal setae. *Wings* with brown veins, membrane everywhere covered with brownish hairs. Lower calyptra brown with dark brown border and fringe. Halteres dull reddish-yellow. *Legs* fuscous; mid tibia with 3 *p* setae and one *pd*; hind femur with stronger *av* setae on only apical half; hind tibia with 2 *ad* near middle, 2 *av* near apical third, a rather strong *pd* beyond apical fourth and a small *pd* at apical third.

Length.—5·7 mm., of wings 5·8 mm.

Distribution.—MALAYA: Gombak Valley, Kuala Lumpur, Selangor, 13.X.21 (*H. M. Pendlebury*), ♀ type (286) presented to British Museum.

29. **Morellia chrysomyzina** sp. n.

(Fig. 23)

♀: Metallic blue with black head, purple reflections on dorsum and greenish reflections on venter. *Head* glossy black, almost without metallic reflections, with silver-white dust on parafacialia and thin grey dust on clypeus; eyes bare, separated by a frons of almost a quarter head-width, which is virtually parallel-sided; interfrontalia matt fuscous, slightly wider behind than a parafrontale and anteriorly tapering to a point, frontal triangle extremely short and broad, only the broadly obtuse apex separated from parafrontalia; the latter with about 8 pairs of moderately strong inclinate setae, which do not quite reach level of anterior ocellus, and with a rather small proclinate orbital seta; ocellars moderately strong inner verticals strong but short, outer verticals apparently rather weak. Antennae and palpi fuscous-brown, arista

plumose in hardly basal half. *Thorax* without pollinosity, with 0+1 *acr*, 0+3 distinct *dc*, of which only the last is moderately strong, 1 *ia*, a strong *prst*, 3 humerals, 2 *npl*, without a *pra*; propleural surrounded by some setulose hairs and placed on a striking tooth-shaped fuscous prominence, anterior part of propleural depression setulose and somewhat embossed, prostigmal absent, beret of hypopleura without setulae. *Abdomen* metallic with well-defined black articulating surfaces, with short decumbent hair and on fourth segment with sparse erect long hairs, hind margin of third segment and lateral hind margin of second with some

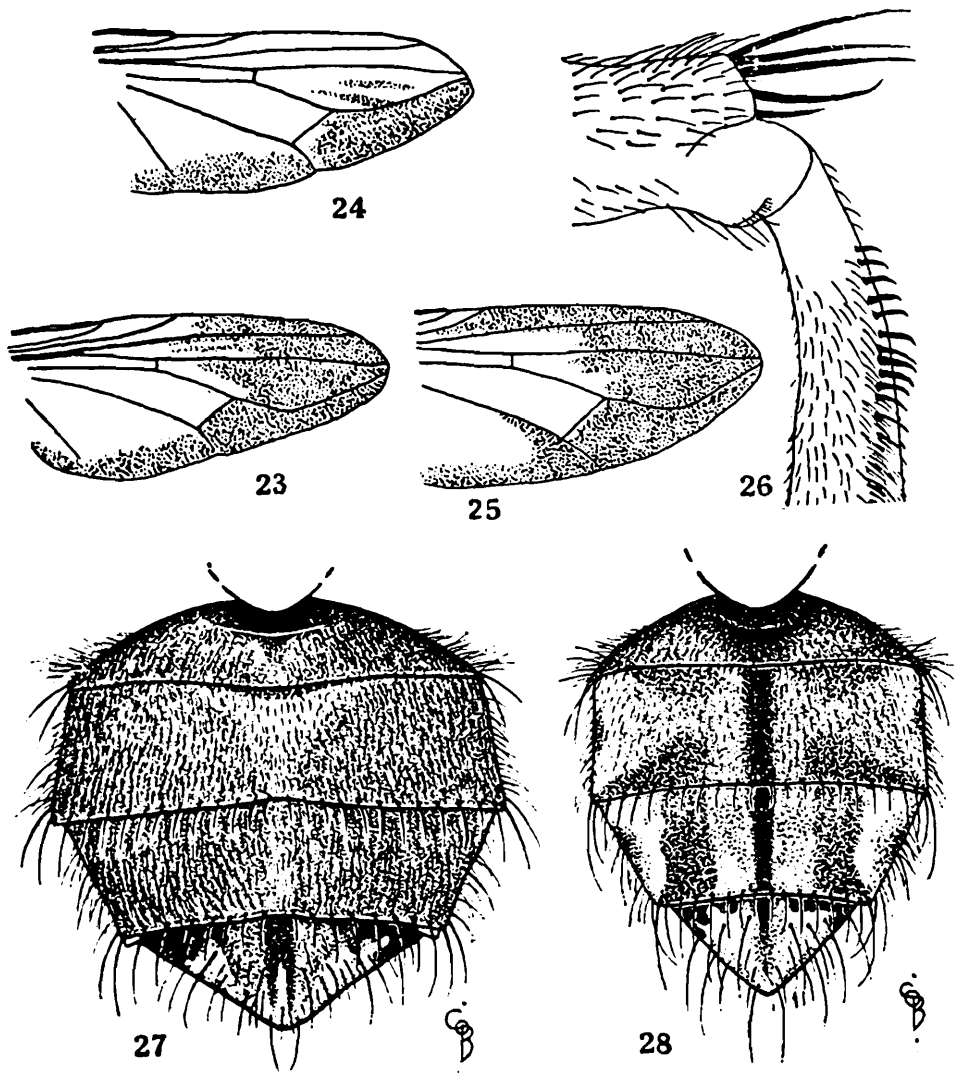


FIG. 23. *Morellia chrysomyzina* sp. n., wing.

FIG. 24. *Morellia viridaurea* sp. n., wing.

FIG. 25. *Morellia albisquama* sp. n., ♀, wing.

FIG. 26. *Morellia quadriremis* sp. n. ♂, anterior view of mid tibia.

FIG. 27. *Morellia nigrisquama* Mall., female abdomen.

FIG. 28. *Morellia hortensia* (Wied.), female abdomen.

longer and stronger but not erect hairs. *Wings* (Fig. 23) with the membrane bare in almost basal half, except towards hind margin, discal cell, anterior basal cell and 2 *C* wholly bare, bend of *m* very broadly and almost evenly rounded from *m-m* to apex; posterior distal angle of discal cell about 100–110°, *m-m* almost twice as long as last section of fifth vein; venation reminiscent of *Chrysomyza demandata* F (Otitidae). Lower calyptra brown on more than apical half. Halteres pale reddish-yellow. *Legs* fuscous-black without distinct metallic reflections; fore tibia without a *p* seta; mid tibia with three *p* setae, the distal one stronger; hind tibia with a strong *pd* at apical fourth and with 4–5 small *av* setae on apical half.

Length.—5·2 mm., of wings 4·5 mm.

Distribution.—ASSAM: Margherita (*Doherty*), ♀ type (in Indian Museum, Calcutta).

30. **Morellia viridaurea** sp. n.

(Fig. 24)

♂: Bright metallic green with golden and coppery reflections on dorsum. *Head* with metallic-green occiput and lower surface and glossy black parafrontalia, but parafacialia and anterior fourth of parafrontalia dusted silver-white, clypeus dusted grey; eyes bare, subcontiguous, separated by less than a twentieth head-width; interfrontalia obsolete except just in front of the short frontal triangle, parafrontalia almost linear with a row of small hair-like frontal setae, ocellars hair-like but distinct, inner verticals rather small but quite conspicuous, outer verticals absent. Palpi and antennae fuscous, the latter somewhat reddish at the joints (aristae of type lost). *Thorax* without pollinosity, with 0+1 very fine *acr*, 0+1 *dc*, 0 *ph*, 0 *prst*, 0 *ia*, 0 humeral, 2 *npl*, a very small *pra*, a strong *sa*, 2 postalars; propleural distinct, prostigmal and anterior mesopleural absent, 1+2 *stpl*, beret of hypopleura without setulae. *Abdomen* without pollinosity, hair decumbent on basal third, fine and erect but not very long on apical part. *Wings* (Fig. 24) hyaline, membrane bare except along hind margin, 2 *C*, R_1, R_3 and discal cell without any hairs, R_5 with some hairs only in posterior half of apical two-thirds; bend of *m* very broad, *m-m* strongly oblique, posterior distal angle of discal cell at least 120° Lower calyptra brownish-grey. Halteres pale reddish-yellow. *Legs* with bright metallic femora and, to a lesser extent, tibiae; fore tibia without a *p* seta; mid tibia with a *p* seta beyond

middle; hind tibia with a fine but rather long *pd* seta near apical fourth and with 3–4 small *av* setae on apical half.

Length.—4·7 mm., of wings 4·4 mm.

Distribution.—BURMA: Rangoon, 23.XII.04–3.I.05 (*E. Brunetti*), ♂ type (in B.M.).

Similar in colouration and in the shape of the discal cell to *M. smaragdina* Ség. from S. Africa, in which the setae of the thorax are more developed, the apex of the wing is solidly haired, the ventral surface of the abdomen dusted, the femora non-metallic, etc. The prosternum of *smaragdina* is formed as in the present species.

31. **Morellia albisquama** sp. n.

(Fig. 25)

♂ ♀ : Body metallic blue with purple and green reflections to green with brassy reflections, underside and part of mesonotum whitish-dusted. *Head* fuscous-black, occiput, jowls and clypeus greyish-dusted, parafacialia and anterior fourth or third of parafrontalia dusted silver-white and interfrontalia dusted brownish; eyes bare, in male contiguous, interfrontalia obsolete at middle and in front and forming an elongate triangle in posterior half, parafrontalia linear behind and at middle, moderately broadened in front, with a complete row of small inclinate and—on posterior two-thirds—proclinate setae; in female separated above middle of frons by a quarter head-width, at vertex by very slightly more, behind lunula by slightly less, interfrontalia strongly and evenly narrowed to fore end, where they are narrower than a parafrontale, whilst at middle they are less than twice width of a parafrontale, frontal triangle small, well separated from parafrontalia; the latter with 6–10 inclinate setae, which do not reach level of ocelli, and on upper part with 3–4 proclinate setae, one of which is moderately strong; ocellars well developed, inner verticals strong. Palpi and antennae fuscous; arista long-plumose, the rays extending into apical third. *Thorax* with a broad silver-dusted median vitta anteriorly and silver-dusted shoulders (in a more anterior view these parts appear greenish-blue on a purple-brown-dusted ground); with 0+1–2 *acr*, 0+2–3 *dc*, 1 *ia*, 2–4 humerals, 1 strong *prst*, 2 *npl*, a small *pra*, 2 *sa*, 3 postalars; propleural, etc., as in generic description, beret of hypopleura without setulae. *Abdomen* with inner half of ventral surface rather densely dusted whitish; hair short and decumbent, on fourth segment longer and erect. *Wings* with the membrane bare on most of basal half, 2 *C*, *Sc*, more

than basal third of R, R_3 and R_5, but in male anterior part of latter almost wholly haired, all of anterior basal cell and in female (Fig. 25), discal cell bare, the posterior cells broadly bare basally; bend of *m* broadly rounded, *m-m* rather strongly oblique. Lower calyptra in female greyish-white with whitish border and fringe, in male brownish with paler border and whitish fringe. Halteres pale reddish-yellow. *Legs* fuscous-brown without metallic reflections; fore tibia without a *p* seta; mid tibia with 2 very small *pd* setae, 2 small *p* and a rather strong *pv* (distinctly more *v* in position than the *p* setae); hind tibia with a strong *pd* at apical fourth, a small *ad* at middle, and 4–5 *av* (increasing in size towards apex) on apical half.

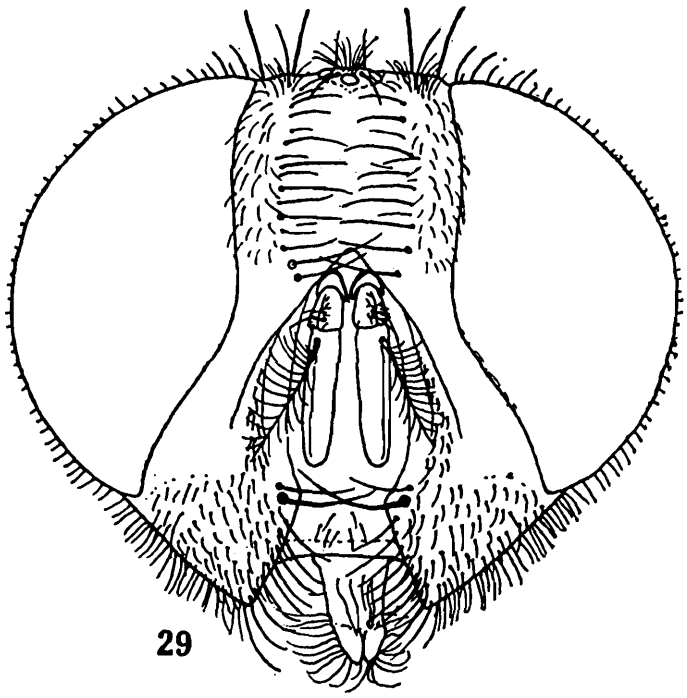
Length.—5–6·3 mm., of wings 4·6–5·8 mm.

Distribution.—S. INDIA: Coimbatore, 31.VII.39. (*P. S. Nathan*), ♀ type (U.S. National Museum, Washington). CEYLON: Kandy, 12.IX.53, 1 ♀ paratype (in Mus. Basle), Lady Horton's Drive, 4.VI.53, 1 ♂ paratype (in B.M.); Haragama, 14.I.54, 1 ♂ paratype (in Mus. Basle) (*F Keiser*).

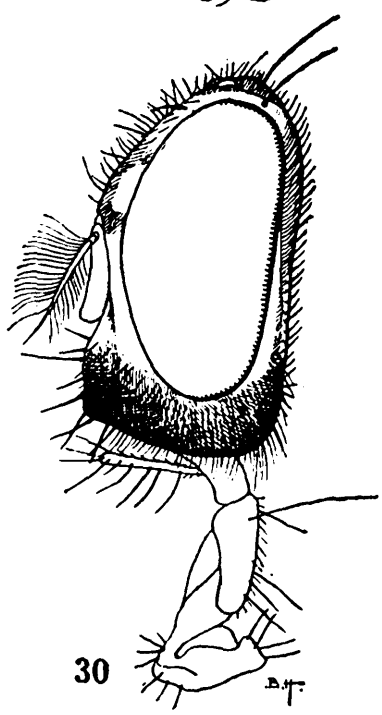
32. **Morellia brunneisquama** sp. n.

♀: Body metallic blue with purple reflections, whitish dust at shoulders and above neck, under side dusted greyish. *Head* fuscous with thin brownish-grey dust on occiput and jowls, clypeus dusted grey, parafacialia and a spot on anterior part of parafrontalia dusted whitish-grey; eyes bare, separated by over a quarter (0·28) head-width, interfrontalia parallel-sided in posterior half, almost thrice width of a parafrontale at middle, rather strongly narrowed with convex sides to lunula, where they are slightly narrower than at parafrontale, frontal triangle small but pointed and well separated from parafrontalia; the latter with 10 pairs of inclinate setae to level of anterior ocellus, the second strong, but the other anterior and the posterior pairs weaker than the intermediate ones, outwards on upper half with three proclinate setae, the foremost rather strong, and a small reclinate; ocellars well developed, inner verticals strong, outer verticals indistinct. Palpi and antennae fuscous, arista long-plumose on basal three-fifths, apical two-fifths bare. *Thorax* with a small silvery spot and some grey dust indicating a median vitta on anterior part and with some greyish-white dust at shoulders, dorsum otherwise thinly dusted brownish, pleurae dusted brownish-white; 1(–4)+2(–6) *acr*, those in ( ) being very weak to indistinct, 2(–4)+4(–5) *dc*, 1 *ia*, 3–4 humerals, 1 *ph*, 1 strong *prst*, 2 strong *npl*, *pra* small but distinct, 2 *sa*,

3 postalars; propleural rather strong, a very weak prostigmal distinct on both sides, beret of hypopleura without setulae. *Abdomen* practically undusted on dorsal surface, conspicuously dusted brownish-white below; with decumbent hair, fourth segment in addition with a number of long and strong erect bristles, under side also with stronger and more erect hair. *Wings* with the membrane wholly haired in anterior



29



30

FIG. 29. *Orthellia fletcheri* Aub., head of female. Type.
FIG. 30. *Orthellia fletcheri* Aub., head of female, profile.

cells, only basal part of R_3 with a bare streak along r_{4+5}, discal cell with a long bare streak near each of its longitudinal veins, the posterior streak almost reaching *m-m*, and the hairs tending to fade out in basal third between the streaks, the open cell behind the fifth vein (*Cu*; of Comstock 1917) with a large bifid bare spot, bend of *m* broadly rounded, *m-m* moderately oblique. Lower calyptra transparent brown with brown border and fringe. Halteres pale reddish-yellow. *Legs* fuscous-brown without metallic reflections; fore tibia without a *p* seta; mid tibia with 5 *p* (*p* and *pd*) setae and a rather strong *pv* (distinctly more *pv* in position than the *p* setae); hind tibia with a strong *pd* seta at apical fourth, 2 very small *ad* near middle, and 5–6 rather closely-spaced *av* setae on apical half.

Length.—5·3 mm., of wings 5·2 mm.

Distribution.—S. INDIA: Muthikolam, 3,000 ft., Coimbatore, 23–26.IX.38 (*B.M. and Colombo Mus. Exped.*), ♀ type (in B.M.).

33. **Morellia hortorum cashmiranas** sp. n.

(Fig. 9*b*)

♂: Black with some silver-white and greyish-white dust. *Head* with silvery dust on anterior surface, including lunula, upper part of parafrontalia more brownish dusted; eyes bare, separated in male by 0·06 times head-width, posterior half of parafrontalia with a row of proclinate setae. Antennae and palpi fuscous-black. *Thorax* with conspicuous white dust at shoulders and on a median vitta and with thin whitish dust along the *dc*, the broad black vitta of each side thus somewhat divided along that line; 1+1 *acr*, the *prst* ones half as widely separated from each other as from the *dc*, 3+4 *dc*, other setae as in the generic description. Prosternal plate bare, slightly broadened in front of fore coxae. *Abdomen* moderately shining, rather thinly dusted whitish-grey, in posterior view with a narrow dark median vitta and slight dark shifting spots; third segment with longer hairs along hind margin, fourth with rather numerous half-erect long and strong hairs on disc. *Wings* with brown veins and wholly haired membrane. Lower calyptra greyish-brown, more strongly browned towards margin, but border and fringe whitish. Halteres pale reddish-yellow. *Legs* fuscous-black; fore femur densely long-haired on *p* and *pv* surfaces, with a dense row of *pv* setae; fore tibia with a row of strong and long *pv* setae on more than apical half, and with dense erect hairs on *v* surface, which become longer

towards the *pv* setae, but without *pd* or *p* setae; mid femur rather densely short-haired on *d* and *pd* surfaces, with a tuft of dense setulae, including the pre-apical setae, near apex of *d* surface and extending from *ad* to *pd* surfaces, the apex lying at a somewhat lower level, mid tibia finely and densely short-haired, with an *ad* row of short stiff erect setulae from near base to beyond middle, these setulae denser and shorter on basal fourth, *p* surface with 6–7 setae, one of them being *pd* in position, the others *p*; hind femur with a row of *av* setae, which are very short, stubby and blunt-tipped to apical third and become gradually longer and pointed in the latter, hind tibia somewhat curved with two fine *pd* setae near basal third and somewhat stronger one towards apical fourth, *ad* surface with a row of half-erect setulae, which become shorter towards apex, *av* surface with a row of half-erect setulae on apical two-thirds, the other hairs of the *a* surface also rather long and erect.

Length.—8·5 mm., of wings 6·6 mm.

Distribution.—KASHMIR: Gulmarg, 8,500 ft., summer 1913 (*F W Thomson*), ♂ type (in B.M.).

The only specimen differs from the European form by wholly browned calyptrae, shorter *av* setae on the third tibia, the setulae on the under side of r_{4+5} extending less than halfway to *r-m*, slightly narrower frons (0·06 times head-width; in N. European specimens of *hortorum* Fln. 0·08–0·11), and especially by the absence of outstanding *pd* setae from the fore tibia. The characters of the female in the above description are those of the European *hortorum*, which may be expected to apply to the female of ssp. *cashmirana*.

34. **Morellia quadriremis** sp. n.

(Fig. 26)

♂: Black with silver-white dust. *Head* rather thickly silver-dusted, occipital dilation more thinly dusted, upper two-thirds of parafrontalia undusted; eyes bare, contiguous, interfrontalia obsolete, except just in front of anterior ocellus, parafrontalia linear, with fine inclinate setae on anterior third and fine proclinate setae on upper two-thirds. Palpi and antennae fuscous; antennae dusted silver-grey, falling short of mouth-margin by two-thirds length of third segment. Vibrissa somewhat above mouth-margin; width of jowls

equal to length of third antennal segment. *Thorax* conspicuously silver-dusted on shoulder region and on a moderately broad median vitta, the resulting glossy-black vittae not divided, though there is a less densely dusted narrow vitta from suture to *ia*; scutellum with silver-dusted spot inward of the sub-basal seta; 0+1(–2) *acr*, only the last 3 *post dc* distinct and only the last 2 strong, other setae as in generic description. Prosternal plate bare, almost parallel-sided between and in front of coxae. *Abdomen* with longer hairs on hind margin of third and with long erect hairs on disc of fourth segment, only a few hairs towards apex of fourth being thicker; silver-dusted with a moderately broad black vitta on intermediate segments and with large dark shifting spots, which run out laterally into a moderately broad dark hind margin and, at least on third segment, into a similar fore margin. *Wings* with light brown to ochraceous veins, membrane with large bare areas on more than basal half, R_3 and R_5 bare at base, first basal cell almost wholly bare, discal cell bare except on a triangular apical patch, the apex of which triangle reaches basad to about level of *r-m*. Lower calyptra whitish-grey including border and fringe, disc slightly smoky. Halteres pale reddish-yellow. *Legs* fuscous-brown, fore femur with dense setulose hairs on *v* surface and a *pv* row of strong setae, which on apical half are placed on gradually stronger tubercles, the apical 4–6 bristles flattened and somewhat dilated to apex, narrowly oar-shaped, fore tibia with a complete row of *ad* setulae ; mid femur (Fig. 26) with 7 strong pre-apicals, which extend from *a* to *p* surface, and the anterior four of which are situated on a transverse ridge, the apex of the femur lying on a markedly lower level, in addition with a row of *pv* setae on basal half, mid tibia with a row of dense short and stout erect setulae on basal fourth, which are extremely short at base and increase in length to the point at basal fourth where the tibia reaches its full width and where it appears slightly thickened, with 2–3 *p* and 3 very small *pd* setae, another stronger seta is more *pv* in position; hind tibia somewhat curved, with a strong *pd*, a row of *ad* setulae, 1–2 of which are somewhat stronger, 2–3 *av* setae (1–2 slightly beyond middle and 1 at apical sixth) and 1–2 decumbent and rather small *pv* setae near apex.

Length.—6–6·3 mm., of wings 5·3–5·7 mm.

Distribution.—CEYLON: Trincomalee, Hot Wells, 7.IX.90

(*Yerbury*), ♂ type; Tamblegram, 5.X.90 (*Yerbury*), ♂ paratype (both in B.M.). INDIA: Bihar, Pusa, 20.X.13 ('*Md.S.*'), ♂ paratype (in Indian Museum, Calcutta).

35. **Morellia sordidisquama** Stein.

1918. *Morellia sordidisquama* Stein, *Ann. Mus. nat. Hung.*, **XVI**, 164. Types: Ceylon. Mus. Budapest.

Fuscous-black with slight metallic reflections and some silver dust. *Head:* Eyes bare, separated in male by half width of third antennal segment, in female at vertex by one-fourth, above lunula by slightly less than one-fourth total head-width; interfrontalia black, obliterated in male, in female more or less parallel-sided, rather more than twice width of a parafrontale; parafrontalia black, silver-dusted anteriorly, in male contiguous and very narrow, bearing a complete series of frontal bristles, which on posterior two-thirds are proclinate, 2–3 of them being quite strong, in female about as wide as third antennal segment, bearing one pair of strong proclinate orbitals and several small ones; parafacialia, face and jowls blackish, with slight silver-dusting; antennae and palpi black. *Thorax* shining black with slight dark purplish or bluish reflections and a short and broad silver-dusted median vitta anteriorly on dorsum, the shoulders also silver-dusted; 0+1 *acr*, 2+4 *dc*, 1 *ia*, *pra* shorter than second *npl*. Prosternum setulose. *Abdomen* shining black with slight purplish reflections, the extreme anterior margins of the segments laterally, and the terminal segment entirely, covered with silver tomentum, a narrow undusted median vitta on first to third segments visible in posterior view. Hair decumbent on anterior three segments, erect, longer and stronger on the fourth. *Wings* hyaline, rather greyish, with dark brown veins; a few bristles at base of third longitudinal vein both above and below. Lower calyptra dark brown, including border and fringe, upper calyptra with the outer third opaque white and border and fringe brown. Halteres yellow. *Legs* brownish-black; hind metatarsus in male bristled on entire length, the bristles at base about twice length of diameter of metatarsus.

Length.—7 mm.

Distribution.—CEYLON. S. INDIA: Naduvatam, Nilgiri Hills.

M. atrisquama Mall. from Borneo, the male of which is still unknown, can be distinguished from this and the following species by only two *av* setae on the hind tibia, which are confined to apical fourth.

36. **Morellia nigrisquama** Malloch.

(Figs. 13, 27)

1928. *Morellia nigrisquama* Malloch, *Ent. Mitt.*, **XVII**, 329. Type: Sumatra, Gunung Singgalang. B.M.

Fuscous-black with slight purplish reflections and some silver and greyish dust. *Head:* Eyes bare, in male closely approximated, in female separated by more than a quarter head-width; interfrontalia black, obliterated in male where the parafrontalia are linear, narrowing anteriorly in female, about twice width of a parafrontale at middle; parafrontalia black, shining, except anteriorly where they are dusted yellowish-grey, anterior half (♂) or whole length (♀) with inclinate setae, posterior half with proclinate setulae, among which there are two stronger setulae (♂) or 2 strong setae (♀); parafacialia, jowls and face black with greyish-brown dust. Palpi and antennae black, third antennal segment dusted grey. *Thorax* shining purplish-black, the pleurae, humeri and a short central stripe on anterior end of dorsum bright silver-dusted, becoming more thinly grey-dusted behind suture, a narrow thinly grey-dusted vitta along the *dc* distinct in posterior view; 0–1+1 *acr*, 2–3+4–5 *dc*, other setae as in generic description. Prosternum hairy. *Abdomen* (Fig. 27) shining purplish-black, thinly and unevenly dusted with silver tomentum, and with a moderately narrow undusted median vitta. *Wings* hyaline with dark-brown veins and evenly hairy membrane; third longitudinal vein setulose almost to small cross-vein above, for shorter distance below. Lower calyptra dark brown, outer part of upper calyptra opaque white. Halteres orange. *Legs* black; mid femur simple at apex, mid tibia with 3–4 *p* and 1–3 small *pd* setae, 1–3 small and 1 strong *pd*, an *ad* row of small setulae, and, in male, some half-erect hairs from middle to apical fourth of *pv* surface.

Length.—7–8 mm., of wings 6·1–6·9 mm.

Distribution.—N. India (Mahae nr. Mussoorie; Assam: Kobo, W of Sadiya). N.E. Burma (Kambaiti). Malaya (Pahang). Sumatra.

37a. **Morellia hortensia** (Wiedemann).

(Figs. 8g, k, 11c, 28)

1824. *Musca hortensia* Wied., *Anal. ent.*, 49; 1830, *Aussereur. zweifl. Ins.*, **II**, 413. Types: Java. Mus. Vienna and Copenhagen.

1909. *Morellia hortensia* (Wied.), Stein, *Tijdschr. Ent.*, **LII**, 209; Malloch, 1925, *Ann. Mag. n. H.* (9), **XVI**, 86.

1934. *Pyrellia nigerrima* Enderl., *Sitzber. Ges. natf. Freunde*, 422; Hennig, 1952, *Beitr. Ent.*, II, 87. Type: Formosa. Mus. Berlin.

Black with silver-white dust. *Head:* Eyes bare, in male subcontiguous, separated by less than width of third antennal segment, interfrontalia linear to obsolete except towards ocelli, parafrontalia linear behind, moderately dilated anteriorly, with inclinate setae on anterior third and with proclinate ones elsewhere, one of these at upper third stronger; frons of female almost three-tenths head-width at vertex, slightly narrowed to anterior fourth where it is just over a quarter head-width, interfrontalia evenly narrowed forward, fully twice width of a parafrontale at middle, parafrontalia on upper half with a row of proclinate setulae, 1–2 of which are stronger, outward of the inclinate setae; anterior two-fifths of parafrontalia and face in both sexes densely silver-dusted, upper part of frons dark, but in anterior view the interfrontalia with a transverse spot of golden-grey dust in front of ocelli. *Thorax* densely silver-dusted on median vitta and laterally, a dark vitta behind suture through the *pra* and *sa* pores, the broad black paramedian vittae not divided; scutellum with a conspicuous vitta of silver dust on either side; 0 (1)+1 *acr*, 3+4–5 *dc*, the anterior 2–3 *post dc* weak, other setae as in generic description. Prosternal plate setulose with somewhat rounded sides. *Abdomen* (Fig. 28) with a row of setae on lateral parts of hind margin of third and across disc and along hind margin of fourth segment; with a moderately narrow undusted median vitta on intermediate segments, hind margin of second in addition with a broad semicircular dark-brown dusted spot, which extends towards fore margin, third in posterior view with a complete broad dark shifting vitta on either side, fourth with a narrow median vitta and a dark shifting basal spot on dorsolateral surface. *Wings* with dark veins and wholly haired membrane, extreme base of discal cell sometimes with a small bare patch, which is shorter than basal width of cell. Lower calyptra greyish-white with whitish border and fringe. Halteres pale reddish-yellow. *Legs* without distinctive secondary sexual characters; mid tibia with a strong *pv* seta between apical third and fourth, fore and hind tibiae with somewhat longer decumbent *pv* hairs, especially in male, hind tibia with a strong *pd* seta beyond apical quarter and a small one near base and with about 3 (♀)–6 (♂) setulose hairs on apical half of *av* surface, these hairs becoming longer towards apex.

Length.—5·5–7·4 mm., of wings 4·9–6·4 mm.

Distribution.—JAVA. SUMATRA. MALAYA (Selangor: Kuala Lumpur; Pahang: Kuala Lipis; Singapore). FORMOSA. SOEMBAWA (Hennig).

Biology.—This species has stalked eggs, which like the larval instars have been described and figured by Muirhead Thomson (1947, *Proc. R. ent. Soc. Lond.* (A), **XXII**, 95). The larvae feed entirely on dung.

I have not seen the specimens from Socotra and S. Africa mentioned by Malloch and consider it probable that they were *M paradoxa* Villen. (*see* the following form).

37b. **Morellia hortensia hortulana** (Wiedemann).

1830. *Musca hortulana* Wied., *Aussereur. zweifl. Ins.*, **II**, 417. Type: China, on a boat. Not in Mus. Copenhagen; lost?

Very similar to the preceding form, from which it differs only by the reduced hairing of the discal cell, of which about the basal third remains bare, the bare area extending somewhat further towards apex along the fourth, and especially fifth, veins. In the female the frons is narrowest at anterior ocellus and very slightly dilated from there to anterior third or fourth.

Distribution.—CEYLON. INDIA (S. India; Punjab; C.P.; N.W India; Simla Hills; Bengal). MALAYA (Pahang; Negri Sembilan; Selangor: Kuala Lumpur). FORMOSA.

I am not able to distinguish the present form reliably from the Ethiopian *Morellia paradoxa* Villen., and the latter is presumably the insect which Malloch recorded as *M. hortensia* from S. Africa. In African specimens the basal half of the discal cell is bare, whilst in Oriental specimens only about the basal third is normally devoid of hairs. The character is, however, somewhat variable, and I have seen a specimen from Samalcota in which the hairs extend even to about basal fifth. This specimen was collected together with a normal one.

38. **Morellia biseta** sp. n.

♂ ♀: Black with silver dust. *Head* with face and anterior third or half of parafrontalia densely silver-dusted; eyes bare, in male subcontiguous, separated by less than width of third antennal segment, interfrontalia linear at middle, very narrow in front and behind, parafrontalia with inclinate, and more or less proclinate, setae on anterior third to half and

with proclinate setulae, among which there are 2–4 stronger ones, on posterior part; frons of female just over a quarter head-width at vertex, hardly narrowed to anterior third, interfrontalia fully twice as wide as a parafrontale at middle, slightly narrowed forward; parafrontalia with about a dozen inclinate setae on each side, and outwards to the setae on the dark part with proclinate setulae and, towards upper third, a strong seta. Antennae fuscous-black; palpi fuscous-brown. *Thorax* densely silver-dusted on median vitta and laterally, the two broad black vittae not divided, at most some small indefinite dots of thin greyish dust being present on *dc* strip, a dark vitta behind suture through the *pra* and *sa* pores; scutellum with a broad silver-dusted vitta on either side; 1+1–2 *acr*, the *prst* one very fine, 3+5 *dc*, the anterior two *post dc* weak, other setae as in generic description. Prosternal plate with setulose slightly rounded sides. *Abdomen* with a row of marginal setae on lateral part of intermediate segments and on fourth segment, the latter also with numerous irregularly arranged discals; dusted silver-grey with a narrow black median vitta, second segment on either side with a large shifting dark spot, which extends from hind margin almost or fully to base, third with a complete shifting dark vitta on either side, fourth with a shifting dark spot at base of lateral surface and another subtriangular one on each side at base of dorsal surface. *Wings* with dark-brown veins and almost wholly haired membrane, a streak at the base of each of the cells behind *m* being bare. Lower calyptra whitish-grey with whitish border and fringe. Halteres pale ochraceous to yellowish. *Legs* fuscous-black; mid femur without *av* setae, with pre-apicals only on *pd* and *p* surfaces, mid tibia with two strong *pv* setae, one at middle and one towards apical fourth, and 3–5 small *p* setae, one of which near apical fourth may be slightly more *pd* in position and smaller; hind femur with the *av* setae stronger on apical, and the *pv* setae stronger (though short) on basal half, hind tibia slightly curved and slightly broader at middle, with a stronger *pd* seta at apical fourth and a weaker one at basal fifth, a small, sometimes indistinct, *ad* well beyond middle, a row of 5–7 *av* setae on more than apical half, which become stronger to apex, and, in male, with longer decumbent *pv* hairs, one of which near apical sixth is longer.

Length.—8·5–9·8 mm., of wings 7·6–8·4 mm.

Distribution.—CEYLON: Habarane, N.C.P., 27.XII.24 (*R. Senior White*), ♂ type (B.M.); Kandy, 12.IX.53, 1.III.54, Lady Horton's, 19.VIII.53; 4.II.54 (*F Keiser*), 6 ♂ paratypes (in B.M. and Mus. Basle). S. INDIA: Cherangode,

Nilgiri Hills, 3,500 ft. X.50 (*P. S. Nathan*), 1 ♂ paratype coll. (*P. H. Arnaud*); same locality, V.50, 1 ♀ paratype (U.S. Nat. Mus.).

Biology.—The type was found on a flower in the forest.

39. **Morellia pectinipes** sp. n.

♀: Black with silver-white pollinosity. *Head* with face and anterior third of parafrontalia silver-dusted, in anterior view the anterior third of the parafrontalia dark and upper part like interfrontalia showing silver-grey reflections; eyes almost bare, frons at vertex almost three-tenths head-width, parallel-sided to anterior third or fourth, interfrontalia 2·5–3 times width of a parafrontale at middle, evenly and slightly narrowed forward, parafrontalia with 9–12 rather unequal inclinate setae and, on outer part of upper two-thirds, with proclinate setulae, among which there is a strong one towards dorsal third and a moderately strong one further dorsad. Palpi and antennae fuscous-brown. *Thorax* with dense silver-white dust on presutural part of median vitta and on shoulders and notopleura, median vitta and the rather narrow vitta from suture to *ia* less densely dusted and thus more greyish, the broad black vittae divided by a rather faint and narrow thinly grey-dusted vitta on the *dc* line; scutellum with a rather narrow dusted silver-grey vitta on each side, which is conspicuous only in posterior view; 0 (1)+1 *acr*, 3+4–5 *dc*, other setae as in generic description. Prosternal plate with setulose, slightly rounded sides. *Abdomen* with distinct marginal setae only at sides of anterior three segments, fourth with a row of very small marginals, but with long erect discals, which are irregularly arranged; pollinosity in a strictly posterior view appearing thin and rather evenly distributed over basal half of intermediate segments except for being slightly thinner at middle of each half and absent from median vitta, in dorsal view these segments appear dark brassy-grey with a conspicuous semicircular or square spot of silvery pollinosity at lateral extremity; fourth segment with the reflections divided on median line and with a small dark shifting basal spot on each side of dorsal surface and an even smaller one at base of lateral surface. *Wings* with light brown veins and wholly hairy membrane (only two short streaks at the base of Cu_1 being bare). Lower calyptra greyish-white with whitish border and fringe. *Legs* fuscous-black; mid femur with pre-apicals only on *pd* and *p* surfaces, mid tibia with 5–7 *p* setae, two of which are stronger and very slightly more *pv* in position without, however,

becoming visible in a strictly anterior view of the tibia; hind femur with strong *av* setae only on apical half, hind tibia with a *pd* seta beyond apical third and a small one near base, with a small *ad* towards apical third and with (3–)4–5 small *av* setae on apical half (or hardly more), these setae rather close to each other and largely separated by only about half their length.

Length.—5·5–6·8 mm., of wings 5·4–6·3 mm.

Distribution.—INDIA: Bihar, Pusa, 6.XI.22, on pony (*Fletcher*), ♀ type; same data 27.X.22, 5.XI.22, 8.XI.22, 3 ♀ paratypes; 2, 3, 20.XII.13, on cattle (*C.S.S.*), 3 ♀ paratypes; 2.XII.14, cow-dung (*Md. S.*), 1 ♀ paratype; 11.III.15, *Justicia* hedge (*Md. S.*), 1 ♀ paratype; no locality, etc., cage I, 4.I.10, 1 ♀ paratype; Mussoorie, U.P., IX.06, 1 ♀ paratype. Type in Indian Museum, Calcutta, paratypes in Indian Museum and B.M. ?CEYLON: Suduganga, 4.VII.22, on window (*R. Senior White*), 1 ♀

Biology.—The capture on pony, cattle and cow-dung suggests habitats similar to those of the other species. The specimens found on a pony are labelled '2 p.m.' and '3 p.m.'

40. **Morellia affixa** Walk.

1857. *Morellia affixa* Walker, *Journ. Proc. Linn. Soc. Lond.*, I, 27. Type: Mt. Ophir. B.M.

♂: Black with silver-grey dust. *Head* silver-dusted, except on upper three-fifths of parafrontalia; eyes bare, separated by less than width of third antennal segment; interfrontalia linear, very narrow in front of ocelli, parafrontalia with all setae more or less proclinate, especially those on upper half, among which two are stronger. Antennae fuscous, palpi dark brown. *Thorax* with conspicuous dense silver dust on median vitta and laterally in front of suture, with thinner silver dust behind suture on median vitta and a narrower vitta from suture to *ia*; some inconspicuous thin grey dust on the line of the *dc*; (1)+1 *acr*, 3+4 *dc*, the last two strong, other setae as in generic description. Prosternal plate setulose, slightly rounded at sides. *Abdomen* with marginal setae on lateral surface of intermediate, and on hind margin of fourth segment, and with irregularly arranged discals on fourth segment, especially towards sides; rather evenly and rather thinly dusted silver-grey with an undusted narrow black median vitta, dust gradually thinner on posterior third and absent from lateral posterior part, but reaching apex on fourth segment. *Wings* with brown veins and wholly hairy membrane (except on small streaks at base of hindmost

cells); r_{4+5} setulose to about middle between node and *r-m*. Lower calyptra greyish-white with whitish border and fringe. Halteres pale reddish-yellow. *Legs* slender; mid femur with pre-apicals on only *pd* and *p* surfaces, mid tibia with a very small *pd* at apical third and with 4 *p* setae, the proximal two small, the distal two long and strong, the last of them very slightly more *pv* in position but not or hardly visible in a strictly anterior view of the tibia; hind tibia with a small *pd* towards basal fourth and a slightly larger one towards apical fourth, with 5–6 widely spaced small *av* setae on apical three-fifths, which setae are separated by almost their length, and with 3–4 small half-decumbent setulae towards apex of *pv* surface.

Length.—10·2 mm., of wings 8·5 mm.

Distribution.—MALAYA: Mt. Ophir.

There is in the B.M. a female of a very similar form from SARAWAK, in which the disc of the anterior three abdominal segments is almost undusted. As the specimen has lost its middle legs and is somewhat smaller, its relationship is somewhat uncertain.

Genus 3. **Mesembrina** Meigen.

1827. *Mesembrina* Meig., *Syst. Beschr. zweifl. Ins.*, **V**, 10. Genotype: *meridiana* L.

1910. *Eumesembrina* Tns., *Smiths. misc. Coll.*, **LI**, 50, 124. Genotype: *latreillei* R.-D.

1910. *Metamesembrina* Tns., *Smiths. misc. Coll.*, **LI**, 50, 124. Genotype: *meridiana* L.

1911. *Neomesembrina* Schnabl and Diedzicki, *Nova Acta Leopold. Car. Akad.*, **XCV**, 226. Genotype: *meridiana* L.

1912. *Hypodermodes* Tns., *Proc. ent. Soc. Wash.*, **XIV**, 46. Genotype: *mystacea* L.

Head with setulae on facial ridges ascending in several rows to above middle, vibrissal angle with about 4–6 strong setae, frons narrow in male, wide in female, orbitals not distinguishable in male, very fine in female; cruciate interfrontal setae present or replaced by more or less numerous converging or cruciate setulose hairs. Eyes bare. Arista plumose. Palpi laterally compressed. *Thorax* broad and stout with dense or very dense erect hair, disc with moderately fine to indistinct setae, lateral setae well developed, 1+2 *npl*, 2 postalars, the other dorsal setae variable, but the hindmost ones always distinct; propleural and prostigmal well developed; anterior mesopleural absent; sternopleurals 0+1, 1+1, or 1+2; scutellum with 5 or more pairs of marginal setae; postalar declivity hairy, suprasquamal ridge bare. Prosternum bare; pteropleura setulose. *Abdomen*

densely haired without setae, male hypopygium inconspicuous. *Wings* orange at base to beyond *r-m*, smoky on apical part, especially along the veins, without any setulae (except on *c*); subcostal sclerite with velvet-like yellow pile only; *m* very broadly rounded, R_5 more or less narrowed to apex, strongly so in Oriental forms. Lower calyptra without setulae. Halteres fuscous. *Legs* slender and fuscous, mid tibia without an *av* seta, with or without an *ad*, with 1–2 strong *pv* and several *p* setae, but in some males instead of the *pv* seta with several rows of very long erect setulose hairs on *pv* surface.

Distribution.—PALAEARCTIC and NEARCTIC REGIONS, extending into S.W CHINA (Szechuan) and N. BURMA. (The Neotropical *'Dexia' aeneiventris* Wied. listed by Sèguy is a Calliphorid of the genus *Mesembrinella.*)

Biology.—Nothing is known about the biology of the only Oriental species, but that of the related *M. meridiana* L. has been studied by various authors including Muirhead Thomson (1937, *Parasitol.*, **XXIX**, 298). The adult is frequently seen on dung but also on tree-trunks, flowers, etc. The eggs are 4·5 mm. long, and, with the anterior end exposed, are laid singly on dung. The larva hatches immediately and can complete its growth by living solely on dung, but in the third stage it also attacks other coprophagous larvae, a fact reflected in the carnivorous type of its cephalo-pharyngeal skeleton.

The only species found within the faunal limits of this volume belongs to the *merdiana* group (=sbg. *Mesembrina* s. str. sensu Townsend 1935), tallying with it in the formation of R_5 and black palpi. Like *magnifica* Aldr. it differs from the rest of the species by bare parafacialia and the reddish-yellow tip of the abdomen.

41. **Mesembrina aurocaudata** sp. n.

♂ ♀: Black, moderately shining, fourth tergite reddish-yellow translucent with the base suffusedly black. *Head* with a glossy black broad occipital dilatation and dull black frons, lower half of temples silver-dusted, parafacialia and jowls to the mouth-margin and to the border of the occipital dilatation densely dusted golden; jowls wholly bare; frons of female over a quarter head-width at vertex, nearly two-fifths at lunula; interfrontalia of female with cruciate interfrontals, almost twice as wide as a parafrontale, the latter with about 10 inclinate setae and outwards with numerous proclinate setulae, 2–3 proclinate setae and, at level of anterior

ocellus, a seta which is bent outward and somewhat backward; ocellars strong, inner verticals strong, outer verticals moderately strong; in male frons hardly as wide as third antennal segment, interfrontalia less than twice width of a parafrontale, the latter with short inclinate-proclinate setae on anterior half and with proclinate setulae on posterior half; ocellars small, verticals as in female. *Thorax* with silver to golden-grey dust on shoulder callosity and on an elongate median spot behind neck, which disappears towards suture; 0+2 *acr*, 3+4 *dc*, only the last *acr* and last two *dc* stronger, or, in male, at all distinct, 3 humerals, 1 *ph*, 1 *prst*, *pra* strong, followed by 2 smaller setae, *sa* very strong; 1+1 *stpl*. *Abdomen* densely black-haired, the hair decumbent in female, denser, finer and more erect in male, in both sexes longer towards and on fourth tergite, becoming rufous on lateral posterior part of third and on fourth segment. *Wings* as in *M. meridiana*; *c* and *m* ending slightly in front of wing tip, apex of *m* thus lying markedly nearer apex than apex of r_{4+5}, and R_5 being hardly wider at apex than at base. Lower calyptra brown with brown fringe and light brown border. *Legs* with rather long and fine hairs on tibiae and under side of femora, especially in male; without *p* setae on fore tibia; mid tibia with 1 *pv* (♀) or a row of about 8 erect *pv* bristles on apical half (♂) which are 2½–3 times as long as tibial diameter; hind tibia of male with the hair on *ad* surface mostly longer than tibial diameter, and with a row of long erect *av* bristles from base to apex, these bristles longer than tibial diameter.

Length.—13–16 mm., of wings 12·5–13·7 mm.

Distribution.—N.W BURMA: Mt. Victoria, Chin Hills, 2,400–2,800 m., V.1938 (*G. Heinrich*), ♀ type (in B.M.). N.E. BURMA: Kambaiti, 2,000 m., 31.III.34 (*R. Malaise*), ♂ paratype (in Mus. Stockholm).

Closely related to *M. magnifica* Aldr. (see above), which differs by greater size (17–18 mm.), the pale hair of the abdomen covering the whole of the third and fourth tergites, and by the temples being wholly grey-dusted.

Apart from the sexual characters the male paratype differs from the type by the pale ochraceous lower calyptra.

Genus 4. **Orthellia** Robineau-Desvoidy.

1860. *Neomyia* Walk., *Proc. Linn. Soc.* (Zool.), **IV**, 138. Genotype: (*gavisa* Walk.=) *chalybea* Wied.

1863. *Orthellia* R.-D., *Diptères des environs de Paris.*, **II**, 837. Genotype: *cornicina* F.

1863. *Euphoria* R.-D., *Diptères des environs de Paris.*, II, 799 (nec Burm. 1842). Genotype: *caesarion* Meig.
1893. *Cryptolucilia* B. B., *Denkschr. Akad. Wiss. Wien.*, LX, 179, 206. Genotype: *caesarion* Meig.
1893. *Pseudopyrellia* Girschn., *Berl. ent. Zeitschr.*, XXXVIII, 306. Genotype: *cornicina* F.
1932. *Scutellorthellia* Tns., *J. N. Y ent. Soc.*, XL, 439. Genotype: *lauta* Wied.
1934. *Stenomitra* Enderl., *Sitz.-ber. Ges. nat. Fr.* 1933, 417. Genotype: *chalybea* Wied.

Brightly metallic flies reminiscent of *Lucilia*. *Head:* Eyes more or less approximated in male, widely separated in female; inclinate frontal setae of female rather weak, of male hair-like to fine, only the anterior pairs stronger; ocellars well developed in female, weak and sometimes indistinct in male; inner verticals well developed, outer verticals absent in male, well developed in female; arista long-plumose. *Thorax:* Chaetotaxy: 0–1+0–1 *acr*, 1 or more *dc*, 0+1 or 0+0 *ia*, *pra* small, 1–2 *sa*, 3 postalars, 1–3 humerals, 0–1 *ph*, 0–1 *prst*, 2 notopleurals; propleural and prostigmal present except in *claripennis*; sternopleurals 0+1, 1+1, 1+2 or 1+3; scutellum with 2–3 pairs of marginal bristles; postalar declivity bare; suprasquamal ridge with strong tufts of hairs in front and behind; lower calyptra devoid of hairs. Prosternum hairy; pteropleura setulose; infra-alar bulla setulose in all Oriental species. *Abdomen:* Male hypopygium inconspicuous. *Wings* with *m* strongly bent forward, angularly or in a gentle curve; subcostal sclerite setulose; r_{4+5} with setulae on upper and lower surface extending at least halfway to small cross-vein, and sometimes further. *Legs:* Middle tibia with a strong *pv* seta and four or more shorter *p* and *pd* bristles.

Distribution.—All zoogeographical regions, but most numerous in the ETHIOPIAN REGION, the ORIENTAL one taking second place.

Biology.—The adults are common on dung, the females laying several batches of eggs just under its surface. The eggs (Fig. 8*d*) are about 2 mm. long, and the larva is purely saprophagous and coprophagous in all three stages, it forms a large proportion of the food of the many carnivorous larvae living in dung.

The genotype is *cornicina* since *Orthellia* R.-D. is *de facto* monotypic, the four species originally included being all synonymous with *cornicina*. *Neomyia*, *Cryptolucilia* and *Scutellorthellia* were also described as monotypic genera, and the types of *Pseudopyrellia* and *Stenomitra* were fixed by original designation. *Euphoria* R.-D. contains 54 names

which are synonymous with *O. caesarion* and four which equal *cornicina*. The type designations by Coquillett (1910) and Townsend (1916) attach this preoccupied name to the latter. *Neomyia* has never been used, except by Enderlein (1934) and the International Commission should be asked to suppress it in favour of the universally-used name *Orthellia*.

O. sperata Walk. 1860 (= *electa* Walk., 1860 = *trispina* Mall., 1928), which occurs in SUMATRA, BORNEO and CELEBES but has not been recorded from the area covered by this volume, differs from all the following species by only one *prst dc*, which is very strong. There are 3 strong *post dc*, and the other key characters are those of *steini*, but the eyes are bare and in male subcontiguous.

Key to the Species of Orthellia

1 (14)	Two pairs of conspicuous *prst dc* present. Anterior mesopleural distinct. ♀ : Interfrontalia wider than a parafrontale, or a pair of strong *prst acr* present.	
2 (3)	A pair of strong *prst acr* present. *m* with a dip behind bend. Three equal, strongly developed pairs of *post dc*, the first not or hardly farther from suture than from second. Wing covered with hairs throughout. Antennae black to fuscous. ♂ : Eyes separated by ⅓–¾ length of third antennal segment, parafrontalia shining blue-green. ♀ : Interfrontalia narrower than parafrontalia, the latter polished; frons wide. . .	*caesarion* (Meig.), p. 121
3 (2)	Without *prst acr*. ♀ : Interfrontalia wider than a parafrontale (Fig. 29), the latter more or less dusted, not polished, not very sharply defined from interfrontalia.	
4 (5)	Vibrissae inserted above mouth-margin by half length of third antennal segment (Figs. 29, 30). Calyptrae and halteres dark brown. *m* without a distinct dip behind bend; discal cell bare on a strip close to fifth vein. Large flies, length 10–12 mm.. . . .	*fletcheri* sp. n. (Aubertin), p. 122
5 (4)	Vibrissae inserted close to, or just above mouth-margin, from which they are separated by up to about width of third antennal segment (*see* Fig. 31).	

6 (11) Discal cell wholly hairy (Pl. 1, fig. 4); *m* usually without a dip behind bend. Mesonotum either conspicuously dusted in front (if viewed from behind), or with only three *post dc*, the anterior two of which are subequal. Mid tibia without an *ad* seta.

7 (8) Tarsi and palpi pale orange, second joint of antennae ferruginous, third ferruginous-infuscate. Mentum incrassate. Palpi rather slender, hardly dilated to apex. Thorax dusted in front, with more than four *post dc*, of which only 2–3 on posterior half of *post* part are strong. 8–10 mm. ♂: Facets enlarged on upper two-thirds of eyes. . . *rufitarsis* (Stein), p. 123

8 (7) Tarsi, palpi and antennae fuscous-black, at most base of third antennal segment narrowly reddish. Palpi markedly compressed and dilated in apical half, somewhat club-shaped in lateral view. Mentum of normal size, hardly half as wide again as third antennal segment. *m* without a dip behind bend. Not reaching 8 mm. in length.

9 (10) Thorax conspicuously dusted brownish in front (if viewed from behind), with four or more *post dc*, of which only 2–3 on posterior two-thirds of *post* part are strong. Eyes virtually bare. ♂: Eyes contiguous, inner facets strongly enlarged. . . . . *coerulea* (Wied.), p. 124

10 (9) Thorax not markedly dusted in posterior view, with only three *post dc*, all of which are strong, and the first of which lies at anterior fourth or third of *post* part. Eyes conspicuously hairy, especially in male, hairs even in female fully as long as basal diameter of arista. ♂: Eyes separated by about twice width of third antennal segment, inner facets only slightly enlarged. . . . . *steini* (Aubertin), p. 125

11 (6) Discal cell with a bare strip (Pl. 1, fig. 3); *m* with a distinct dip behind bend. Mesonotum not markedly dusted in front and with more than three *post dc*, the anterior 2–4 of which are inconspicuous. Palpi slender.

12 (13) Mid tibia with an *ad* seta between apical fifth and fourth. Second segment of antenna ferruginous, third and palpi infuscate ferruginous. Nearly basal half of discal cell bare, the bare area extended towards apex along fourth and fifth veins, but less along fourth. ♂: Facets on inner part of eyes strongly enlarged. *indica* (R.-D.), p. 126

13 (12) Mid tibia without an *ad* seta. Second antennal segment strongly infuscate, third narrowly reddish at base, otherwise like palpi fuscous. Discal cell hairy except on a longitudinal strip close to fifth vein. ♂: Facets on inner part of eyes only slightly enlarged. *coeruleifrons* (Macq.), p. 127

14 (1) *prst dc* absent or indistinct. Anterior mesopleural absent. Anterior *stpl* weak or absent. *prst acr* absent. Mid tibia without an *ad* seta. ♀: Interfrontalia distinctly narrower than parafrontalia, at least at some places in or behind middle, parafrontalia polished (Fig. 31).

15 (16) Bend of wing subangular. Palpi and antennae brownish-orange, somewhat infuscated. Discal cell without hairs (at most with a few odd ones near middle of apex). 0+2–3 distinct *dc*, but only the last one strong. Black colouration of articulating surface somewhat extended over base of segment on either side of median line of abdominal segments two and three. *m-m* closer to bend than to *r-m*. Base of wings yellowish. Calyptrae not or lightly browned. Halteres fuscous. ♂: Facets strongly enlarged on inner two-thirds of eye. ♀: Frons wider than an eye. *lauta* (Wied.), p. 128

16 (15) Bend of *m* very broadly and evenly rounded. Palpi and antennae fuscous. Discal cell more or less extensively haired, at least apical third largely hairy. Black colouration of articulating surface of intermediate abdominal segments not extending over base of segments. ♂: Facets only slightly enlarged on inner part of eyes. ♀: Frons much narrower than an eye.

17 (20) *m-m* closer to bend than to *r-m*, very oblique and somewhat sigmoid. Calyptrae dark brown, especially the lower one.

18 (19) *prsc acr* absent or indistinct. Section of costa between r_{4+5} and *m* one-sixth to one-fifth length of preceding section. *post ia* almost always absent. Body less robust. The hairs of the wing occupy a larger part, especially more or less all of anterior length of *Sc* and whole width of apical third of discal cell, extending far basad on anterior part of latter. *claripennis* (Mall.), p. 130

19 (18) *prsc acr* distinct. Section of costa between r_{4+5} and *m* one-quarter to one-third length of preceding section. *post ia* almost always present. Body stout. The hairs on the wing occupy a smaller part of it, especially not posterior part of apex of discal cell. (Base of wings not or only slightly infuscated; *Sc* with only a few hairs: ssp. *faceta* Enderl.) . . . *chalybea* (Wied.), p. 131

20 (17) *m-m* at middle between bend and *r-m*, rather straight and steep. Calyptrae lightly infuscate. *prsc acr* and *ia* distinct. *Sc* densely covered with hairs, which even invade apex of *C*, more than apical half of discal cell covered with hair. Anterior and basal third to half of wing yellowish tinged. *diffidens* (Walk.), p. 132

42. **Orthellia caesarion** (Meigen).

1826. *Musca caesarion* Meig., *Syst. Beschr. zweifl. Insekt.*, V, 57. Type: Portugal. Mus. Copenhagen ?

Metallic green, blue-green or brassy-green, fourth abdominal segment more brassy or bronze, parafrontalia glossy, more blue, usually with purple reflections. Palpi and antennae fuscous-black. *Head:* Eyes rather densely short-haired, more distinctly so in male, where they are separated by 1·5–2 times width of third antennal segment, interfrontalia linear at middle, narrow in front and behind, parafrontalia moderately narrow, fully half as wide at middle as third antennal segment, broadened in front; vertex in female more than a third head-width, parafrontalia more than half as wide again as the almost parallel-sided interfrontalia, without distinct upper orbitals, parafacialia of similar width,

contrasting by dense silver dust like the area between occipital dilation and vibrissae; the latter well above mouth-margin. *Thorax* shining, the thin greyish dust becoming evident only in a tangential view; 1+1 *acr*, the *prst* ones halfway between first and second *dc*; 2+3 strong *dc*; anterior mesopleural distinct; pleural setae normal. *Abdomen* without distinct setae among the setulose hairs. *Wings* with light brown veins and wholly hairy membrane; basicosta black, subcostal sclerite with 1–2 black setulae; stem-vein with 1 setula; *m* with subangular bend and a dip behind it. Lower calyptra greyish-white, slightly smoky along margins, especially in male. Halteres fuscous. *Legs:* Coxae and femora with slight metallic green reflections, very thinly dusted and not very shining.

Length.—5·5–8·0 mm., of wings 5·4–6·8 mm.

Distribution.—MEXICO. NEARCTIC and PALAEARCTIC REGIONS. In INDIA only in the HIMALAYAS. KASHMIR: Gulmarg; Baniar; Dal Lake. PUNJAB: Simla Hills. U.P. (Uttar Pradesh): Mussoorie; Dehra Dun; Yangti V ; Almora ; Naini Tal. NEPAL: Mt. Everest. BENGAL: Darjeeling.

Biology.—Found on cow-dung, in which the larvae feed. In one specimen the *prst acr* are lacking.

43. **Orthellia fletcheri** sp. nov.

(Figs. 29, 30)

Type-locality.—Ceylon. B.M.

♀: *Head* (Figs. 29, 30): Eyes bare, separated at vertex by distance equal to ¼ total head-width; frons dark brown, more or less parallel-sided, about twice width of one parafrontale; parafrontals black, bare on upper two-thirds, which are slightly shining and purplish in colour, covered on anterior third with yellowish-grey tomentum; two weak fronto-orbital bristles, ocellar bristles strong; parafrontals and face covered with greyish tomentum in which there are red lights; jowls shining black, black-haired facialia converging below, the vibrissae inserted well above margin of epistome; face lying deep, except between vibrissae and thence to margin of epistome, bearing on lower part one or two setulae; antennae dark brown, third segment four times length of second, slightly grey-dusted; palpi dark brown; back of head bluish-green, slightly grey-dusted. *Thorax* bluish-purple, slightly dusted anteriorly; 0+1 *acr*, 2+4 or 5 *dc* (anterior postsutural bristles much reduced), 1 *ia*, 2 or 3 *sa*, 2 postalars; prostigmatic and anterior mesopleural

bristle present, 1+3 *stpl.* *Abdomen* shining bluish-purple. *Wings* hyaline; fourth vein bending forward at an obtuse angle; basicosta dark brown; subcostal sclerite with setulae; one or two setulae below at base of first and second longitudinal veins; setulae above and below at base of third longitudinal vein, those on underside reaching well beyond small cross-vein. Squama dark brown. Halteres dark brown. *Legs* dark brown; hind tibia distally with a flat fan of bristles on posterior surface (only visible from certain angles).

Length.—9–11 mm., of wings 8–10 mm.

Distribution.—CEYLON: Pundaluoya (*E. E. Green*), ♀ type (in B.M.). N. BENGAL: Siliguri, 1 ♀ paratype; Kurseong, 1 ♀ paratype; Darjeeling, 1 ♀ paratype, both Indian Museum (*D. Aubertin*). Also seen from ASSAM: Shillong (Ind. Mus.), S. INDIA: Kodaikanal (B.M.) and N.E. BURMA: Kambaiti, 2,000 m. (*R. Malaise*), 2 ♀ (one in Mus. Stockholm, the other in B.M.) (*F v. E.*).

44. **Orthellia rufitarsis** (Stein).

1920. *Cryptolucilia rufitarsis* Stein, *Tijdschr. Ent.*, **LXII**, Suppl., 40. Type: Simalur. Mus. Amsterdam.

Metallic green with brassy or bluish reflections. *Head* rather densely dusted whitish-grey, face translucent rufous, clypeus paler, palpi and antennae light orange, third antennal segment duller, except at base, proboscis brown-orange, mentum about twice as wide as third antennal segment, jowls reddish-brown; eyes bare, in male contiguous, with strongly enlarged inner facets, interfrontalia obsolete at middle, linear in front, parafrontalia linear at middle, narrower than antennae in front; vertex in female almost three-tenths head-width, interfrontalia almost twice as wide at middle as a parafrontale, the latter dusted, more thinly so on upper half, with proclinate black setulae arranged in about three irregular rows, 3–4 longer ones (the upper orbitals) among them on upper two-fifths; parafacialia narrower than third antennal segment. *Thorax* rather densely whitish-dusted anteriorly, less densely on disc of dorsal surface, especially in female; with a pair of linear darker metallic vittae anteriorly which are four times as widely separated from each other as from *dc*; 0+1 *acr*, 2+4–6 *dc*, the anterior 2–4 *post* pairs small; *ia* present; 3 postalars; anterior mesopleural present; 1+3 *stpl*, other pleural setae normal. *Abdomen* with the hair much more erect on fourth tergite, setae missing. *Wings* with light brown veins and wholly hairy

membrane; basicosta orange; subcostal sclerite with some dark setulae; stem-vein with one setula; *m* with subangular bend, without or with a slight dip behind it, in the former case apical cross-vein largely straight. Lower calyptra brownish in male with yellowish border and fringe, whitish-grey in female with whitish border and fringe. Halteres dull yellow. *Legs:* Coxae and femora dark brown, tibiae brownish-orange, tarsi pale orange.

Length.—9–10 mm., of wings 8–8·8 mm.

Distribution.—LOWER BURMA: Tenasserim (Ind. Mus.). MALAYA: Kuala Lumpur (B.M.). LOWER SIAM: Trong (U.S. National Museum). SIMALUR.

The Burma and Siam specimens have a slight dip behind the bend of *m*, but in the Malaya specimen the posterior part of the apical transverse vein is quite straight.

45. **Orthellia coerulea** (Wiedemann).

(Pl. 1, fig. 4)

1819. *Musca coerulea* Wied., *Zool. Mag.*, **III**, 23; 1830, *Aussereur. zweifl. Ins.*, **II**, 406 and 654. Types: Java. Mus. Copenhagen and Vienna. (Vienna type seen by Miss Aubertin.)

1830. *Lucilia timorensis* R.-D., *Myodaires*, 460. Type: Timor. Mus. Paris (seen by Miss Aubertin).

1843. *Lucilia philippensis* Macq., *Dipt. Exot.*, **II**, pt. 3, 146. Type: Philippine Is.

1851. ! *Lucilia coeruleifrons* Macq. (pars), *Dipt. Exot. Suppl.*, 4, pt. 2, 248. Type: Java. B.M.

1851. *Lucilia viridiceps* Macq., *Dipt. Exot. Suppl.*, 4, pt. 2, 249. Type: Australia (seen by Miss Aubertin).

1859. ! *Pyrellia benedicta* Walk., *Journ. Proc. Linn. Soc.*, **III**, 105. Type: Aru. B.M.

1859. ! *Pyrellia obtrusa* Walk., *Journ. Proc. Linn. Soc.*, **III**, 105. Type: Aru. B.M.

1860. ! *Lucilia intrahens* Walk., *Journ. Proc. Linn. Soc.*, **IV**, 137. Type: Macassar. B.M.

1864. ! *Pyrellia porphyricola* Walk., *Journ. Proc. Linn. Soc.*, **VII**, 215. Type: Mysol. B.M.

1878. ! *Pyrellia stella* Big., *Ann. Soc. ent. France* (5), **VIII**, 34. Type : Ceylon. coll. J. E. Collin, Newmarket. (n. syn.)

1887. *Somomyia atrifacies* Big., *Bull. Soc. Zool. Fr.*, 601. Type: Calcutta (seen by Miss Aubertin).

1923. ! *Orthellia diffidens* Walk., of Malloch, *Ann. Mag. n. H.* (9), **XII**, 518 (nec Walk.).

Metallic bronze-green, blue-green or purple-blue, with fuscous anterior surface of head and fuscous palpi and antennae, base of third antennal segment sometimes reddish. *Head* fuscous with metallic occiput and temples; upper two-fifths of parafrontalia slightly metallic in female; eyes

practically bare, in male contiguous with the facets more or less enlarged on inner side, interfrontalia obsolete or linear at middle and narrow in front and behind; vertex of female almost fully one-third head-width, interfrontalia about twice as wide at middle as a parafrontale, the latter thinly dusted brownish, moderately shining, with proclinate black setulae on outer part in about two irregular rows, the upper orbitals conspicuously longer and rather distinct; parafacialia of male much, of female little, narrower than third antennal segment, in female somewhat contrastingly dusted whitish-grey. Palpi markedly compressed and appearing clavate in lateral view. *Thorax* rather thickly dusted greyish- to brownish-white anteriorly, with a pair of linear brown vittae in front, which are five times as widely separated from each other as from the *dc*; 0+1 *acr*, 2+4–5 *dc*, the anterior 1–3 *post* pairs small; *ia* present, 3 postalars; anterior mesopleural present; 1+3 *stpl*, the second often small, other pleural setae normal. *Abdomen* with the hair much more erect on fourth segment, without setae. *Wings* with light brown veins and wholly hairy membrane; basicosta brown; subcostal sclerite with some long dark setulae; stem-vein with one setula; *m* with an obtuse bend, straight behind it. Lower calyptra, including border and fringe, brown in male, brownish white in female. Halteres pale yellow. *Legs* dark brown to fuscous, thinly dusted, without metallic reflections.

Length.—5·5–8·4 mm., of wings 4·8–7·1 mm.

Distribution.—CEYLON. INDIA (S. India; U.P.; Bihar; Bengal; Assam). SIKKIM. NEPAL. BURMA (Lower and Upper). MALAYA. SIAM. CHINA. FORMOSA. JAPAN. INDONESIA to AUSTRALIA and SOLOMON IS.

Biology.—On dung, but also often found on plants (basking ?), sometimes in houses on windows.

46. **Orthellia steini** Aubertin.

1933. *Orthellia steini* Aubertin, *Ann. Mag. n. H.* (10), **XI**, 142. Type: Madras. Indian Mus., Calcutta, paratype in B.M.

Head: Eyes separated, in male by twice width of third antennal segment, in female by one-third total head-width, sparsely short-haired in male and microscopically haired in female; frons black, parallel-sided; parafrontalia in male narrow, metallic towards vertex, covered with silver tomentum anteriorly and bearing a row of fine frontal bristles; in female each parafrontale equals in width to that of frons,

metallic coloured on upper two-thirds, silver-dusted anteriorly, bearing a row of fine frontal bristles and a single fine inwardly directed fronto-orbital bristle; parafacialia covered with silver tomentum; jowls shining blue-green; palpi and antennae dark brown to black. *Thorax* shining green to purple; 2+3 *dc* (all well developed); 0+1 *acr*; anterior mesopleural present. *Abdomen* shining green to purple, equal in length, or slightly longer than thorax. *Wings* hyaline; *m* rounded in an obtuse angle. Lower calyptra testaceous in male, white in female. Halteres dull orange. *Legs* black; femora partly metallic in colouring.

Length.—6–8 mm., of wings 6–6·5 mm.

Distribution.—S. INDIA: Madras, Ootacamund, Nilgiri Hills, 7,500 ft., ♂ type and 3 ♀ paratypes in Indian Mus., Calcutta, 2 ♀ paratypes in B.M. Nilgiri Hills; Palni Hills, Kodaikanal.

47. **Orthellia indica** (Robineau-Desvoidy).

(Pl. 1, fig. 3).

1830. *Lucilia indica* R.-D., *Myodaires*, 453. Type: Bengal. Mus. Paris (seen by Miss Aubertin).
1918. *Cryptolucilia obscuripes* Stein, *Ann. Mus. nat. Hungar.*, **XVI**, 149. Type: Formosa. Mus. Budapest.
1933. *Lucilia viridifrons* Macq. (pars) of Aubertin, *Ann. Mag. n. H.* (10), **XI**, 141 (nec Macquart ?).
1933. *Orthellia latifrons* Mall. of Aubertin, *Ann. Mag. n. H.* (10), **XI**, 141 (nec Malloch); Snyder, 1951, *Amer. Mus. Novit.*, 1533, 22.

Bronze-green to bluish-green, anterior part of mesonotum almost always with a conspicuous brassy or bronze tinge. *Head* metallic green on occiput, otherwise infuscate dull reddish with the jowls and in female parafrontalia metallic green; eyes bare, in male contiguous with strongly enlarged facets on upper inner part, interfrontalia obsolete at middle, narrow in front and behind; vertex in female about a third head-width, interfrontalia more than half as wide again as a parafrontale, the latter metallic green, thinly dusted on upper, but rather thickly on lower, half, with 2–3 rows of black proclinate setulae, palpi slender, dull brown-red, second antennal segment and base of third bright ferruginous. *Thorax* very thinly and inconspicuously dusted, the linear vittae only traceable near neck, if at all; 0+1 *acr*, 2+4–6 *dc*, but the *post* ones small or indistinct except the last 2-3, *post ia* present, 3 postalars; anterior mesopleural present; 1+3 *stpl*, other pleural setae normal. *Abdomen* without

setae, hair on fourth segment somewhat longer and more erect. *Wings* with pale testaceous veins and extensive bare areas on basal parts of membrane, *2nd C* and *Sc* largely bare, R_1 with a bare streak at base, base of discal cell and a streak extending this area along fourth and especially fifth veins, and base of Cu_1 largely devoid of hairs; basicosta fuscous; subcostal sclerite with rather few black setulae; stem-vein with one setula; *m* with subangular bend and a slight dip behind it. Lower calyptra greyish-white, slightly smoky in male. Halteres dull brown. *Legs* fuscous-brown, without metallic reflections, thinly dusted; mid tibia with an *ad* seta beyond apical fourth.

Length.—6–8·3 mm., of wings 5·2–6·4 mm.

Distribution.—CEYLON. INDIA (Madras; Bombay; C.P. (Madhya Pradesh); N.W India; U.P. (Uttar Pradesh); Bihar; Bengal; Assam). BURMA. MALAYA. Also seen from SIAM, LAOS and SUMATRA, and recorded from JAVA, LOMBOK, SOEMBAWA, FLORES, FORMOSA. *O. latifrons* Mall. has no *ad* on the mid tibia and is not identical with the present species, which has therefore not been recorded from the ETHIOPIAN REGION (including the Madagascar subregion).

Biology.—The flies are found on horse- and cow-dung.

48. **Orthellia coeruleifrons** (Macquart).

1851. ! *Lucilia coeruleifrons* Macq., *Dipt. Exot. Suppl.*, 4, 248. Types: Java. B.M.

1857. ! *Lucilia trita* Walk., *Journ. Proc. Linn. Soc.*, **I**, 24. Type: Malacca. B.M.

1923. ! *Orthellia siamensis* Mall., *Ann. Mag. n. H.* (9), **XII**, 509. Type: Nah Khum. B.M.

1933. *Lucilia viridifrons* Macq. of Aubertin, *Ann. Mag. n. H.* (10), **XI**, 144 (nec Macquart); Hennig, 1952, *Beitr. Ent.*, **II**, 90 (*pars*).

Bluish-green, the thorax often more or less deep purple. *Head* fuscous in front, occiput, temples, jowls, and in female parafrontalia, metallic; eyes bare, in male contiguous or subcontiguous, with the upper inner facets distinctly but only moderately enlarged, interfrontalia obsolete, linear or very narrow at middle, narrow in front and behind; vertex in female almost three-tenths head-width, interfrontalia half as wide again as a parafrontale, the latter metallic purple, very thinly dusted, but rather densely and contrastingly dusted on anterior third, with 2–3 rows of rather short black proclinate setulae and on upper part 3 somewhat longer upper orbital setulae; palpi fuscous, slender, second antennal

segment dark brown, third fuscous with the base narrowly orange. *Thorax* with very thin and inconspicuous dust, which is somewhat more distinct only in lateral view on the pair of vittae; 0+1 *acr*, a pair of small setae slightly behind level of *acr* (=*prsc*) between them and the *dc*; 2+5–6 *dc*, the *post* ones very small or indistinct, except for the last 2–3, *ia* well developed, 3 postalars; anterior mesopleural present; 1+3 *stpl*, other pleural setae normal. *Abdomen* without setae, but hair of fourth segment long and erect. *Wings* with brown veins and the membrane everywhere hairy except on a strip in the discal cell along the fifth vein; basicosta fuscous, subcostal sclerite with long black setulae especially on posterior apical part; stem-vein with one bristle; *m* with a subangular bend and a distinct dip beyond it. Lower calyptra, including border and fringe, dark brown in male, whitish-brown in female. Halteres fuscous. *Legs* fuscous-brown, thinly dusted, without metallic reflections.

Length.—6·0–9·0 mm., of wings 5·5–7·7 mm.

Distribution.—CEYLON. INDIA (S. India; U.P. (Uttar Pradesh); Bihar; Assam). NEPAL. BURMA (N.E. Burma; Mergui). MALAYA. SIAM. LAOS. FORMOSA. SUMATRA. JAVA. LOMBOK. FLORES.

Biology.—Larvae in cow-dung.

This species has been identified as *O. viridifrons* Macq., 1843, by Miss Aubertin, but that species was described from Mauritius, and its male has yellowish-white ('blanc jaunâtre') calyptrae. The present species, however, is not known to occur there, and its male has dark brown calyptrae. Of *O. flavicalyptrata* Macq., 1848, from Java the male was said by Macquart to differ from *coerulea* Wied. by yellowish calyptrae, which again does not apply to the present species. Most of the typical specimens of *O. coeruleifrons* Macq. belong to *coerulea*, but two females, one of them without a head, are the present species. The bigger one of these, with a head, is herewith selected as the type or *coeruleifrons* Macq., the name of the species having been based by Macquart on the female sex.

49. **Orthellia lauta** (Wiedemann).

1830. *Musca lauta* Wied., *Aussereur. zweifl. Ins.*, **II**, 410. Types: Java. Mus. Copenhagen and Vienna. (Vienna type seen by Miss Aubertin.)

1830. *Lucilia eximia* R.-D., *Myodaires*, 456 (nec *Musca* (=*Lucilia*) *eximia* Wied. 1830). Type: Timor. Mus. Paris (seen by Miss Aubertin).

1830. *Lucilia bengalensis* R.-D., *Myodaires*, 460. Type: Bengal. Mus. Paris (seen by Miss Aubertin).
1849. *Musca* (*Lucilia*) *proerna* Walk., *List. Dipt. Brit. Mus.*, IV, 888. Type: locality unknown. B.M.
1852. *Musca polita* Walk., *Ins. Saund.*, 338. Type: East Indies. B.M.
1923. *Orthellia lauta* Wied., Mall., *Ann. Mag. n. H.* (9), XII, 513; 1928, *Ent. Mitt.*, XVII, 330; Aubertin, 1933, *Ann. Mag. n. H.* (10), XI, 141; Hennig, 1952, *Beitr. Ent.*, II, 88.

Metallic green or blue-green, usually more or less purple, especially on scutellum and posterior part of mesonotum. *Head* purple or green on occiput, jowls, and in female parafrontalia, otherwise dull reddish to fuscous; eyes bare, in male contiguous with strongly enlarged facets on upper inner part, interfrontalia obsolete except at extremities; vertex in female almost two-fifths (0·37) head-width, interfrontalia about two-thirds width of a parafrontale, the latter thinly silver-dusted on anterior two-thirds, with numerous half-erect black hairs, especially on upper half, parafacialia with dense silver dust, which reaches level of arista interiorly and anterior third of parafrontalia exteriorly. Palpi and antennae dull orange, third antennal segment somewhat browned. *Thorax* with very slight pollinosity, which is only noticeable in a tangential view, hair long, fine and erect, 0+1 *acr*, 0+2–3 *dc*, only the last two *post* ones being well developed, *ia* well developed, three postalars, anterior mesopleural absent, 1+2 *stpl*, the intermediate one, however, small; other pleural setae normal. *Abdomen* without setae, fourth segment with long erect fine hair, other segments in male with fine, moderately long erect hair, in female with the usual decumbent hair; second and third segments normally with a black non-metallic suffusion at extreme base behind boundary of articulating surface. *Wings* with ochraceous to brown veins and largely naked membrane, the hairs of the apical and posterior part hardly passing level of *m-m*, basal third of R_5 thus bare, and discal cell wholly or virtually devoid of hairs; basicosta and base of wing yellowish-orange; subcostal sclerite with only 2–4 very fine erect hairs, which are little darkened; stem-vein with one setula; *m* with a subangular bend and a distinct dip beyond it. Lower calyptra whitish-yellow, slightly smoky. Halteres fuscous. *Legs* fuscous-brown, thinly dusted, without distinct metallic reflections.

Length.—5·4–8·3 mm., of wings 4·7–6·4 mm.

Distribution.—CEYLON. WEST PAKISTAN: Punjab. INDIA (S. India; C.P. (Madhya Pradesh); N.W. India; U.P. (Uttar

Pradesh); Bihar; Bengal; Assam). NEPAL. BURMA (Lower and Upper). MALAYA. SIAM. LAOS. SUMATRA. BORNEO. JAVA. LOMBOK. SOEMBAWA. FLORES. AUSTRALIA.

Biology.—Common on cow-dung and other dung, in which the larva lives, also on human ordure, on dead animals and meat.

50. **Orthellia claripennis** Malloch.

1923. *Orthellia claripennis* Mall., *Ann. Mag. n. H.* (9), **XII**, 515; Hennig, 1952, *Beitr. Ent.*, **II**, 89. Type: India.

Glossy dark purple-blue, the male with conspicuous greenish fluorescence. *Head* glossy black, without or with indistinct metallic reflections; clypeus grey pollinose, matt, anterior end of parafrontalia with a small, upper end of parafacialia with a larger silver-dusted spot; eyes virtually bare, in male contiguous, the inner facets somewhat enlarged; in female vertex about a quarter head-width, parafrontalia glossy, wider than interfrontalia, close to ocelli at least twice as wide, on outer part with proclinate hairs and on upper half with 4–5 longer setulae, which are bent outward; vibrissa somewhat above mouth-margin (by about width of third antennal segment); palpi and third antennal segment matt fuscous, second antennal segment glossy black. *Thorax* with dense and fine erect, in female somewhat shorter, hair, without any dust; *acr* absent, 0+1 *dc*, *ia* normally absent, posthumeral and *prst* absent, 1–2 humerals, both *npl*, *pra*, one *sa* and 2 postalars (the innermost being absent or indistinct) well developed; anterior mesopleural absent, propleural and prostigmal absent (hair-like), 0+1 *stpl*; scutellum only with the basal and apical pairs of setae. *Abdomen* without distinct setae among the hairs. *Wings* with brown veins and only the greater apical half of the membrane and the whole hind margin hairy, the hairs reaching not much basad of level of *r-m*; basicosta black; stem-vein with one setula; subcostal sclerite with numerous black setulae; bend of *m* evenly rounded. Lower calyptra brown, including border and fringe. Halteres pale yellowish. *Legs* glossy black with slight purple and blue reflections, not dusted; hind femur without outstanding *pv* setae, hind tibia with only 1–2(–3) *av* setae.

Length.—5·2–8 mm., of wings 4·7–7·4 mm.

Distribution.—CEYLON. INDIA: S. India (Coorg; Nilgiri Hills; Palni Hills; Walayar Forest). N.E. India (N. Bihar: Pusa; Thamaspur; Bengal: Kurseong; Darjeeling; Assam: Margherita; Gauhati; N. Khasi Hills). SIKKIM 1,000–4,000 ft.

NEPAL. U. BURMA (N.E. BURMA: Kambaiti; Goktrik). SUMATRA, LOMBOK. SOEMBAWA. FLORES. FORMOSA.

Biology.—Attached to human ordure.

51. **Orthellia chalybea faceta** (Enderlein).

(Fig. 31)

1928. ? *Orthellia coeruleifrons* Macq., Mall., *Ent. Mitt.*, **XVII**, 392 (nec Macquart).

1934. *Neomyia faceta* End., *Sitzber. Ges. naturf. Fr.*, 1934, 420; Hennig, 1952, *Beitr. Ent.*, **II**, 88. Types: Formosa (Kosempo). Mus. Berlin.

Dark purple-blue, abdomen sometimes greenish-blue, especially the male with greenish 'fluorescent' reflections on dorsum. *Head* glossy black, only the occiput with metallic reflections, lowest part of parafrontalia and upper part of

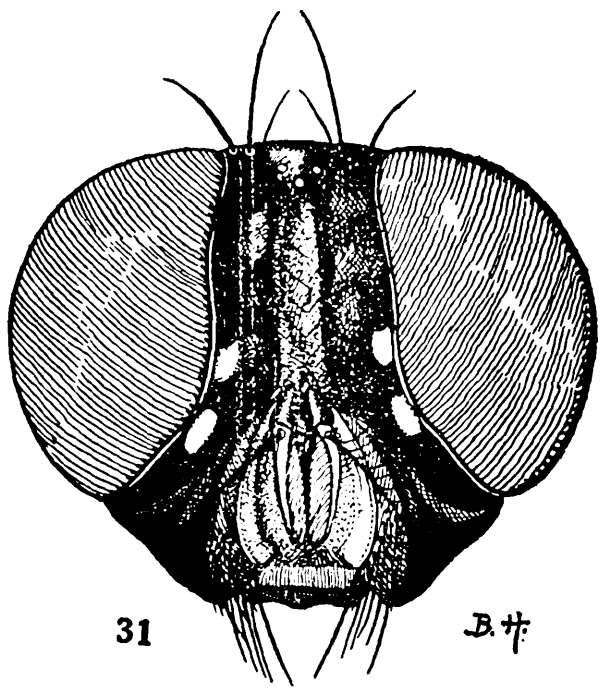


FIG. 31. *Orthellia chalybea* (Wied.), head of female.

parafacialia each with a spot of silver pollinosity, these spots in male elongate; parafrontalia of female sometimes with slight metallic reflections; eyes virtually bare, in male separated by $\frac{1}{2}$–$\frac{3}{4}$ width of third antennal segment, inner facets slightly enlarged, interfrontalia and parafrontalia linear or almost so, the former not markedly wider in front and behind; in female (Fig. 31) vertex a quarter head-width or slightly wider, interfrontalia at middle slightly narrower or slightly wider, in front of ocelli always markedly narrower

than a parafrontale, the latter glossy with numerous erect fine black setulae; vibrissa somewhat above mouth-margin (by more than width of third antennal segment), mouth-margin distinctly somewhat produced in lateral view though straight between vibrissal angles. Palpi and antennae fuscous-black, the former broadened and compressed, in lateral view club-shaped. *Thorax* with very dense, erect, fine, even hair, which in female is somewhat shorter, without any dust; 0+1 *acr* and *dc*; *ia* present, *pra*, one *sa* and two postalars present; anterior mesopleural absent, 0+1 *stpl*; other pleural setae normal. *Abdomen* without setae, but fourth segment and lateral posterior part of third with long erect fine hairs. *Wings* with brown veins and incompletely haired membrane, hairs present on apical half and hind margin, hardly exceeding *r-m*; basal two-fifths of discal cell and, along fifth vein, a strip which practically reaches apex of discal cell bare; cubital and anal cells hairy on less than marginal half; basicosta fuscous; base of wing with suffused smoky spots just beyond *h* and between r_5 and *m*, but not solidly darkened; subcostal sclerite with some long wiry black setulae; stem-vein with one setula; *m* with a broadly rounded bend. Lower calyptra dark brown, including border and fringe. Halteres pale yellow. *Legs* piceous-brown hardly dusted, without metallic reflections; hind femur with 1–2 strong *pv* setae at two-fifths, hind tibia with 4–6 *av* setae.

Length.—6·6–9·6 mm., of wings 7·4–9·3 mm.

Distribution.—CEYLON (Habarane). WEST PAKISTAN: N.W Frontier Province. N. INDIA (Kashmir; N.E. Punjab: Simla; N. U.P. (Uttar Pradesh): Almora; N. tip of Bengal; Assam). SIKKIM. NEPAL. UPPER BURMA. CHINA (Hong Kong; Chungking). SUMATRA. E. JAVA. TAMAON ISLES.

The type form, *O. chalybea* Wied., 1830 (*Aussereur. zweifl. Ins.*, II, 402), which occurs in JAVA, SUMATRA, CELEBES, differs only by the dark brown colouration of the base of the wing to slightly beyond *h* and the more extensively haired membrane, *Sc*, for instance, being densely covered with hairs. The synonyms *gavisa* Walk. and *nitidifacies* Big. refer to the type form.

52. **Orthellia diffidens** (Walker).

1857. ! *Musca* (*Pyrellia*) *diffidens* Walk., *Journ. Proc. Linn. Soc.*, I, 26. Type: Singapore (♂, not ♀ as stated by Walker). B.M.

1857. ! *Musca* (*Pyrellia*) *refixa* Walk., *Journ. Proc. Linn. Soc.*, I, 26. Type: Singapore. In B.M.

1857. ! *Musca* (*Pyrellia*) *perfixa* Walk., *Journ. Proc. Linn. Soc.*, I, 26. Type: Mt. Ophir. B.M.

1860. ! *Musca* (*Pyrellia*) *optata* Walk., *Journ. Proc. Linn. Soc.*, I, 137. Type: Celebes: Makassar. In B.M.

1923. *Orthellia coeruleifrons* (Macq.) of Malloch (nec Macq.), *Ann. Mag. n. H.* (9), XII, 515, 519; Karl, 1935, *Arb. morph. tax. Ent.*, II, 34.

Dark purple-blue, greenish-blue or bluish-green, sometimes even with brassy sheen, thorax with some greenish 'fluorescence'. *Head* glossy piceous, occiput and, in female, parafrontalia with metallic reflections, jowls with slight ones; anterior third (♂) or sixth (♀) of parafrontalia and an elongate spot extending over most of parafacialia silver-dusted, these spots sometimes continuous in male; eyes bare, in male contiguous with only slightly enlarged upper interior facets, interfrontalia obsolete or linear, not markedly wider in front and behind, parafrontalia linear; in female vertex about one-fifth head-width, interfrontalia at middle slightly narrower or slightly wider than a parafrontale, in front of ocelli more or less distinctly narrower, parafrontalia anteriorly with two rows of black proclinate setulae, these are more numerous above, where about four longer ones stand out; vibrissa separated from mouth-margin by less than width of third antennal segment. Palpi and antennae fuscous, third antennal segment sometimes dull reddish translucent. *Thorax* with rather dense short, somewhat erect hair, without appreciable dust; 0+1 *acr*, a seta between *acr* and *dc*, 0+1 *dc*, *ia*, *pra*, one *sa* and three postalars present; anterior mesopleural absent; 0+1 *stpl*. *Abdomen* without distinct setae, but marginal hairs stronger at sides, fourth segment with long and erect but sparser hairs. *Wings* with light brown veins and extensively haired membrane, practically wholly hairy in front of *m*, second basal cell, extreme base of discal cell and a strip in less than basal half of the latter along fifth vein bare as is most of the basal half of the following two cells; basicosta dark brown; subcostal sclerite with a few blackish setulae; stem-vein with one setula; *m* with a broadly rounded bend, apical transverse vein rather close to, and almost parallel with, wing margin. Lower calyptra including border and fringe light ochraceous-grey in male, whitish-grey in female. Halteres pale yellow. *Legs* piceous-brown, very thinly dusted, femora with slight metallic reflections.

Length.—5·8–8·1 mm., of wings 5·7–7·4 mm.

Distribution.—CEYLON. INDIA (C.P. (Madhya Pradesh); U.P. (Uttar Pradesh); Assam). BURMA (Mergui). MALAYA. SIAM. SUMATRA. BORNEO. JAVA. CELEBES.

Genus 5. **Pyrellia** Robineau-Desvoidy.

1830. *Pyrellia* R.-D., *Myod.*, 462. Genotype: *cadaverina* L.

Metallic green, blue or purple. *Head:* Eyes approximated in male, widely separated in female; inclinate frontal setae rather weak in female, hair-like in male; cruciate interfrontals absent; ocellars well developed in female, indistinct in male; inner verticals well developed, outer verticals well developed in female, absent in male. *Thorax* with 0+1 *acr*, 2+4–6 *dc*, the anterior *post dc*, however, indistinct if more than 2+4 are present; 1 *ia*, *pra* small, 1–2 *sa*, 3 postalars, 3 humerals, 1 *ph*, 1 *prst*, 2 *npl*; propleural and prostigmal present; *stpl* 1+2–4, usually 1+3, the second group in an oblique row, the hind and uppermost bristle being the strongest; scutellum with 2 pairs of marginals and 1 pair of pre-apical discals; postalar declivity and suprasquamal ridge without setulae, lower calyptra bare. Prosternum bare (in Oriental species); infra-alar bulla bare; pteropleura setulose. *Abdomen* subglobular; male hypopygium inconspicuous. *Wings:* subcostal sclerite with a single small setulose hair (in Oriental forms); stem-vein bare; base of r_s with 1–2 setulose hairs, base of r_{4+5} setulose about halfway to *r-m*; *m* broadly rounded and bent forward near apex. *Legs* fuscous-black; fore tibia without a submedian seta, mid tibia with a strong *pv* seta and several small *p* setae, hind tibia with a conspicuous *pd* beyond middle.

Distribution.—All zoogeographical regions.

Biology.—Adults on decaying animal matter, especially dung, also on flowers. Larvae in excrements and carrion, on which they feed.

Key to the Species of Pyrellia

1 (2) Anterior thoracic spiracle yellowish white. Fly bright glossy green, usually with brassy reflections, thorax and abdomen without pale dust, *acr* hairs in front of suture in 8–9 irregular rows. Anterior mesopleural present. Lower calyptra whitish or yellowish, somewhat smoky. Silver pollen covering anterior two-fifths or half of parafrontalia... . . . *scintillans* Big., p. 135

2 (1) Anterior thoracic spiracle dark brown. Fly green-blue to purple-blue, seldom with brassy reflections. *acr* hairs in front of (and

close to) suture in more than 10 irregular rows. Silver pollen of parafrontalia covering less than anterior third.

3 (4) Anterior mesopleural absent. 4 *post dc*, the anterior two weak but very distinct, sometimes a much smaller fifth between the first and second. Lower calyptra whitish, in male somewhat smoky. Fly green-blue, seldom with brassy reflections, thorax and abdomen without pale dust. ♀ : Silver dust of parafrontalia ascending only to level of hind margin of lunula. *cadaverina* (L.), p. 136

4 (3) Anterior mesopleural present. Anterior *post dc* indistinct, only the last 2–3, on little more than posterior half of *post* part, distinct. Lower calyptra brown in male, smoky in female. Fly dark-blue with purple and blue-green reflections.

5 (6) Mid tibia without an *ad* seta. Thorax and abdomen glossy purple-blue without any pale dust. Interior postalar (just in front of inner end of postalar callosity) almost hair-like. ♀ : Parafrontalia dusted on about anterior fourth.. *purpureonitens* sp. n., p. 137

6 (5) Mid tibia with a small *ad* seta. Thorax with a broad median vitta and the shoulder region dusted pale grey, the *post* part thinly grey-dusted apart from a pair of not very conspicuous broad vittae, which are indistinctly divided by some faint grey dust on the line of the *dc*; scutellum and abdomen also with some thin brownish-grey dust. Interior postalar conspicuous. ♀ : Pale dust not ascending on parafrontalia beyond level of hind margin of lunula. *proferens* Walk., p. 138

53. **Pyrellia scintillans** Bigot.

1887. ! *Pyrellia scintillans* Bigot, *Bull. Soc. zool. Fr.*, **XII**, 616. Type: Cape. Coll. Collin, Newmarket.

1927. ! *Pyrellia mitis* Curran, *Ann. Mag. n. H.* (9), **XIX**, 530. Type: Barberton. Pretoria ?, paratypes in B.M.

Bright glossy green with fuscous head, thorax and abdomen usually with brassy, centre of disc sometimes with

purple, reflections. *Head* densely dusted silver-white on face and anterior two-fifths to half of parafrontalia; eyes bare, separated in male by less than half width of third antennal segment, but by nearly twice width of antenna at vertex and at anterior end of lunula; interfrontalia obsolete, parafrontalia linear at middle, moderately dilated anteriorly, with very small and fine inclinate and proclinate setae; frons of female at vertex three-tenths head-width, interfrontalia fuscous-brown, four times width of a parafrontale at middle, strongly narrowed anteriorly, frontal triangle exceeding middle. Antennae and palpi fuscous-brown. *Thorax* with the *acr* hairs in front of suture in 8–9 irregular rows, the narrow bare vitta between the outermost row and the *dc* inconspicuous, sometimes somewhat more brassy or purple; more than 4 *post dc*, the anterior ones indistinct. *Abdomen* with short decumbent hair, except on lateral part of third and on fourth segment, where the hair becomes longer and more erect. *Wings* with pale testaceous or pale ochraceous veins and wholly hairy membrane. *Legs* fuscous-brown without distinct metallic reflections; mid tibia without an *ad* seta; hind tibia with 2–3 *av* setae.

Length.—3·3–5·7 mm., of wings 3·4–4·8 mm.

Distribution.—C. AND N. INDIA (C.P. (Madhya Pradesh); Punjab; U.P. (Uttar Pradesh); Bihar; Bengal). NEPAL. MALAYA: Singapore. ETHIOPIAN REGION.

Biology.—Larva in fresh and old dung of horse and donkey.

Ethiopian specimens do not differ from Oriental ones except for the setula on the subcostal sclerite, which I have not been able to see in any of the available African specimens.

54. **Pyrellia cadaverina** (Linnaeus).

1761. *Musca cadaverina* L., *Fauna Suec.* (ed. **II**), 451. Type: Sweden. Linn. Soc. London.

Normally much more blue-green than *scintillans*, bright metallic blue-green or green-blue, thorax somewhat bluer than abdomen, seldom with brassy reflections. *Head* black with metallic green occiput and silver-grey dusted face, the pollinosity ascending on parafrontalia to nearly lower third in male, but only to level of hind margin of lunula in female, leaving in this sex the inner part of the parafrontalia and the inner upper part of the parafacialia glossy black; eyes bare, subcontiguous in male but separated at vertex and antennal base by almost twice width of antennae, interfrontalia very narrow in front and behind, obsolete at middle,

inclinate setae very fine and small; frons of female about a third head-width at vertex, almost unnoticeably dilated to middle and as slightly narrowed to lunula, interfrontalia dull fuscous, slightly dilated to middle, conspicuously narrowed anteriorly, frontal triangle reaching middle. Antennae and palpi fuscous. *Thorax* with finer, denser and more erect hair than in *scintillans*, the narrow bare paramedian vittae faint or indistinct; 2+4 conspicuous *dc*, though the anterior two *post dc* are somewhat weaker. *Abdomen* of male with rather long erect hair, except on either side of disc where it is short and decumbent, of female with short decumbent hair except on posterior lateral part of third and the whole of fourth segments. *Wings* with ochraceous to light brown veins and wholly hairy membrane. *Legs* fuscous-black, the femora with conspicuous metallic reflections; mid tibia without an *ad* seta; hind tibia with 2–3 *av* setae.

Length.—4·4–7·2 mm., of wings 4·2–5·9 mm.

Distribution.—KASHMIR: Baniar; Chitral. A HOLARCTIC species.

55. **Pyrellia purpureonitens** sp. n.

♂ ♀: Glossy purple-blue, abdomen and underside with some green reflections; thorax and abdomen without any pollinosity. *Head* fuscous-black, face grey-dusted including in male anterior quarter of parafrontalia; in female this pollinosity does not extend beyond hind margin of lunula, leaving inner upper part of parafacialia and inner anterior part of parafrontalia glossy black; eyes bare, contiguous in male, interfrontalia obsolete, parafrontalia almost obsolete at middle, moderately broadened in front, very narrow behind, inclinate setae hair-like and small; frons of female at vertex nearly three-tenths head-width, very slightly widened anteriorly, interfrontalia dull fuscous, half as wide again as a parafrontale at middle, slightly wider at anterior fourth, considerably narrowed to anterior extremity; frontal triangle reaching middle. Antennae and palpi fuscous. *Thorax* with fine and erect hair; *dc* very fine, only the last one strong and the first *prst* and last *post* but one conspicuous. *Abdomen* with short hair; longer hairs present only on posterior lateral part of third and on fourth segments. *Wings* with light brown veins and wholly hairy membrane. Lower calyptra dark-brown, including border and fringe. *Legs* piceous-black without metallic reflections; mid tibia without an *ad* seta; hind tibia without outstanding *av* setae.

Length.—4–4·9 mm., of wings 4·3 mm.

Distribution.—MALAYA: Penang, 3–8.VIII.06 (*E. Brunetti*) ♀ type (in B.M.). INDIA: Walayar Forest, S. Malabar, 2,000 ft., 22.VII.39 (*P. S. Nathan*), ♂ paratype (in U.S. Nat. Mus.).

56. **Pyrellia proferens** Walker.

1860. !*Pyrellia proferens* Walk., *Journ. Proc. Linn. Soc. London*, IV, 138. Types: Macassar. B.M.

1918. *Morellia cyanicolor* Stein, *Ann. Mus. nat. Hungar.*, **XVI**, 164; Hennig, 1952, *Beitr. Ent.*, **II**, 87. Types: Matheran. Mus. Budapest (n.syn.).

Black with dark blue, blue-green and purple reflections, these reflections even darker on a broad vitta, which follows the *dc* and which is indistinctly divided by thin grey dust along the line of the *dc* on either side. Face pale grey dusted, parafacialia with silver-white reflections; thorax between the vittae with some grey dust reflecting white, especially in front, shoulders and notopleurae also dusted. Scutellum and abdomen with very thin grey dust, which is visible only in posterior view, and which on the abdomen is distinct only towards lateral surface and usually on a pair of transversely oblique ovate spots on fourth segment. *Head:* Eyes of male contiguous, frons with fine and short inclinate setae up to level of ocelli. Antennae and palpi fuscous-black. *Thorax* with 0+1 *acr*, 3–4 *prst dc*, 2–3 strong *post dc* and a row of setulae from the anterior one to the suture; only posterior *ia* present; *pra* rather strong though shorter than the second *npl*; the other setae developed normally; scutellum strikingly triangular with a pair of strong marginal setae near base and at apex, in addition with a pair of discals near apex. Prosternum, propleural depression, and infra-alar bulla bare; propleural and prostigmal well developed; anterior thoracic spiracle fuscous; 1+3(–4) *stpl*, the posterior group forming an oblique row. *Abdomen* without strong setae, but a marginal row of longer and somewhat stronger hairs is distinct laterally on intermediate segments, the fourth with numerous similar erect hairs. *Wings:* r_{4+5} with setulose hairs from the base about halfway to *r-m*, the latter at three-fifths of discal cell, anterior apical angle of the latter rather sharp, *m-m* being oblique and almost straight. Lower calyptra fuscous-brown, in female smoky grey. Halteres pale yellow. *Legs* fuscous-black; mid tibia with a small *ad* at apical fifth, a strong *pv* and several small *p* and *pd* setae; hind tibia with a strong

pd at apical fourth, a small *ad* beyond middle or at apical third, and 3–4 small *av* on apical half.

Length.—6–6·5 mm.

Distribution.—INDIA: Matheran (2 ♂ paratypes seen). S. INDIA: Coimbatore; Mysore: Bangalore; Cherambadi, Wynaad. U. BURMA: Maymyo. CELEBES: Macassar (♂ type and ♂ paratype of *proferens* seen). LOMBOK.

By being transferred to *Pyrellia, Morellia cyanicolor* Stein becomes a homonym of *Pyrellia cyanicolor* Zett. However, since the latter is a *Dasyphora*, this synonymy is only a secondary one, and no new name is necessary. Moreover, *cyanicolor* appears to be identical with *proferens* Walk., only the undusted thoracic vittae being even less noticeable in the types of this form, which difference may be due to the age of the specimens.

Genus 6. **Dasyphora** Robineau-Desvoidy.

1830. *Dasyphora* R.-D., *Myod.*, 409. Genotype: *pratorum* Meig.
1911. *Eudasyphora* Tns., *Proc. ent. Soc. Wash.*, **XIII**, 170. Genotype: (*lasiophthalma* Macq.) = *cyanella* Meig.
1931. sbg. *Rypellia* Mall., *Ann. Mag. n. H.* (10), **VII**, 190; 1932, l.c. (10), **X**, 305. Genotype: *flavipes* Mall.
1935. *Dasyphorina* End., *Sitzber. Ges. naturf. Fr.*, 1935, 238. Genotype: *saltuum* Rond.

Head: Eyes approximated in male, widely separated in female; inclinate frontal setae extending over whole length of frons, not very strong in female, weak to hair-like in male, the anterior ones stronger; ocellars well-developed in female, very fine or indistinct in male; inner verticals well-developed, outer verticals weak or absent in male, well-developed in female; female with two proclinate orbitals, without cruciate interfrontals; arista long-plumose. *Thorax* rather stout, 0–2+1 *acr*, 2(3)+4 *dc*, 0+2 *ia*, *pra* about as long as second *npl*, 2 *sa*, 3 postalars, 3 humerals, 1–2 *ph*, 1 *prst*, 2 *npl*; propleural and prostigmal present, anterior mesopleural distinct, 1+3 *stpl*, 3 strong and often 1–2 weak scutellars on each side; suprasquamal ridge and infra-alar bulla not setulose; pteropleura setulose. *Abdomen* with somewhat longer hairs only on hind margins of segments, hairs somewhat stronger at sides, and on disc and sides of fourth segment where they may become seta-like (but irregularly arranged). *Wings* with evenly haired membrane and broadly rounded bend of *m*, R_5 about as wide at apex as at base; r_{4+5} setulose nearly to tip (though setulae of dorsal surface small); r_1 often with some setulae on dorsal surface; subcostal sclerite with one

or (normally) several black setulae. *Legs:* Fore tibia without a *p* seta; mid tibia with a strong *pv* seta, several unequal small *p* setae, and with or without an *ad* seta; hind tibia with a *pd* seta at about apical fourth.

Distribution.—PALAEARCTIC REGION and N.W part of the ORIENTAL REGION, the sbg. *Rypellia* in the E. and S.E. part of the ORIENTAL REGION.

Biology.—In temperate climates the adults of some species hibernate and are often found in houses. European species are oviparous, the eggs being laid in batches just under the surface of the dung (*cyanella* Meig.; Muirhead Thomson, 1937, *Parasitology*, **XXIX**, 279), or viviparous, producing third-stage larvae (*pratorum* Meig.; Keilin, 1916, *Arch. Zool. experim.*, **LV**, 398). The larvae are purely coprophagous in dung of cows, rarely pigs, and as a rule are found singly or in small numbers (Zimin, 1948, *Opred. Faune. SSSR.*, **28**, 79). Nothing is known of the biology of sbg. *Rypellia*.

If *Dasyphora* (with setulose postalar declivity but bare prosternum), *Dasyphorina* and *Rypellia* were to be accepted as genera, *versicolor* with hairy prosternum would be entitled to at least the same rank. Though the characters used by Malloch do not hold good for separating *Rypellia* from the rest, the smaller size, less metallic colouration, different distribution and absence of an *ad* seta from the mid tibia indicate that this group is less closely related to the others than these are among themselves, and it is therefore retained as a subgenus. Further Oriental species of sbg. *Rypellia* were described and keyed by Malloch (1932).

Key to the Species of Dasyphora

1 (6) Mid tibia with a strong *ad* seta beyond middle. r_1 normally with some black setulae on dorsal surface. Large metallic blue to green species with entirely dark ground-colour of N.W. and N. India (sbg. *Dasyphora* s. str.).

2 (5) Eyes with long dense hair. Calyptrae and anterior thoracic spiracle whitish or yellowish. Halteres yellowish.

3 (4) *prst acr* absent. Prosternum and posterior part of postalar declivity with conspicuous black setulae. ♂: Hind metatarsus at base of ventral surface with a striking hairy brush-like process (Fig. 32).... *versicolor* (Meig.), p. 141

4 (3) *prst acr* present, one pair strong. Prosternum and posterior part of

		postalar declivity bare. ♂ : Hind metatarsus simple.... .	*saltuum* Rond., p. 143
5	(2)	Eyes practically bare. Lower calyptra and anterior thoracic spiracle fuscous-brown. Halteres dull brownish. *prst acr* absent. Prosternum and posterior part of postalar declivity bare. ♂ : Hind metatarsus simple.	*cyanicolor kempi* Aubertin ssp. n., p. 144
6	(1)	Mid tibia without an *ad* seta. r_1 normally bare. *prst acr* absent. Prosternum and posterior part of postalar declivity bare. Smaller species, which are only slightly metallic and often partly testaceous in colour. Halteres pale yellowish. Burma to Formosa and Java.	(sbg. *Rypellia* Mall.), p. 145
7	(8)	Eyes with long dense hair. Body, legs, palpi and antennae wholly dark in ground-colour. Calyptrae brown, including border and fringe. Anterior thoracic spiracle brown.	*malaisei* sp. n., p. 145
8	(7)	Eyes bare. At least femora, tibiae and anterior thoracic spiracle pale coloured.	
9	(10)	Body wholly brassy or bluish-black.	*flavipes* Mall., p. 146
10	(9)	Scutellum, shoulders, lateral part of mesonotum, coxae, trochanters, infra-alar bulla, base of abdomen and antenna brownish-yellow....	*flavipennis* sp. n., p. 147

57. **Dasyphora versicolor** (Meigen).

(Fig. 32)

1826. *Musca versicolor* Meig., *Syst. Beschr.*, **V**, 77. Type: Austria. Mus. Paris ?

Dark greenish-blue, rather densely dusted whitish. *Head* with silver-white dust on parafacialia and anterior part of parafrontalia, the latter otherwise dusted grey; eyes with dense long hairs; separated in male by less than width of third antennal segment, interfrontalia very narrow in front and behind, linear at middle, parafrontalia linear at middle and behind, as wide anteriorly as third antennal segment; frons of female almost a third head-width at vertex, slightly wider at lunula, interfrontalia somewhat narrowed in front and behind, twice as wide at middle as a parafrontale, the latter with numerous fine proclinate hairs outwards of the

frontal setae; width of jowls greater than length of third antennal segment. Antennae and palpi fuscous-black. *Thorax* moderately shining on disc, with four narrow undusted vittae, more densely dusted in female; 0+1 *acr*, 3+4 *dc*, 3 marginal and 1 pre-apical scutellar, a small marginal at base usually also distinct. *Abdomen* rather evenly and moderately densely whitish-dusted with a narrow and in-

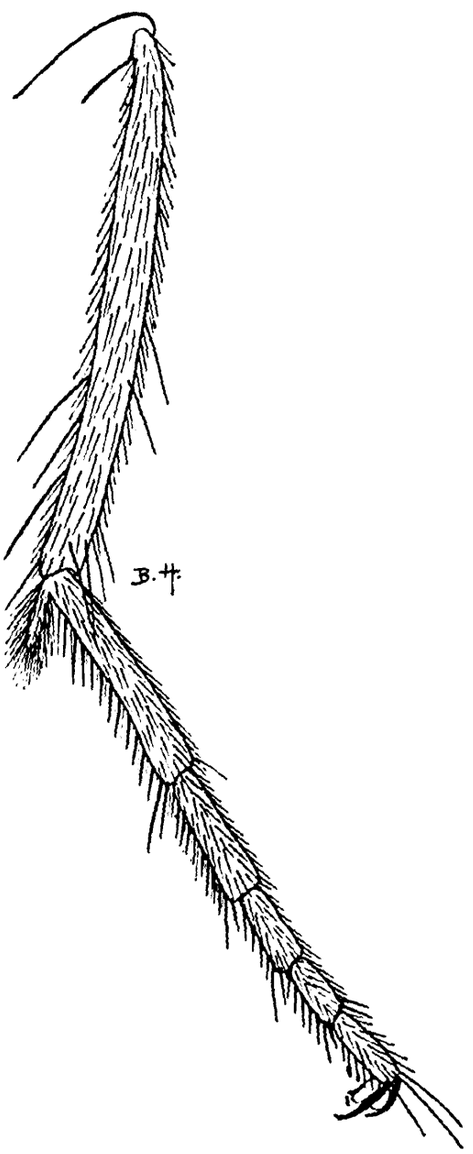


FIG. 32. *Dasyphora versicolor* (Meig.), hind tibia and tarsus of male.

conspicuous undusted median vitta on segments 2–3(4), the bases and hind margins of the intermediate segments in certain directions appearing undusted. *Wings* greyish-hyaline with brown veins, r_1 with some setulae on dorsal surface of intermediate, and sometimes also apical, part.

Calyptrae whitish with whitish border and fringe. *Legs* wholly fuscous-black; mid tibia with a strong *ad* seta; hind metatarsus with a long hairy process (Fig. 32).

Length.—7·9–9·8 mm., of wings 7·4–9·8 mm.

Distribution.—C. AND S. EUROPE. N. INDIA (Simla Hills to Kumaon).

58. **Dasyphora saltuum** Rondani.

1862. *Dasyphora saltuum* Rond., *Prodr.*, V, 207. Types: Italy: Parma; Insubria; Naples.

Dark olive-green, bluish-green or purplish-blue, rather densely whitish-dusted. *Head* fuscous with dense silver-white (♂) or silver-grey (♀) dust on parafacialia and anterior half of parafrontalia, the latter otherwise thinly dusted brownish-grey; eyes with dense long hairs; separated in male by less than width of third antennal segment, interfrontalia rather narrow in front, very narrow behind, linear at middle, parafrontalia linear at middle and behind, somewhat wider anteriorly than third antennal segment; frons of female three-tenths head-width at vertex, slightly dilated to lunula, interfrontalia hardly narrowed except very close to lunula, 2–3 times as wide at middle as a parafrontale, the latter with sparse fine black proclinate setulae outwards of the frontal setae; width of jowls in male subequal to, in female somewhat less than, length of third antennal segment. Antennae and palpi fuscous. *Thorax* moderately shining on disc, with four undusted vittae, more densely dusted anteriorly and in female; 2+1 *acr*, none close to suture; 3+4 *dc*, 4 marginal (including a small one at base) and 1 pre-apical scutellar. *Abdomen* very thinly whitish-dusted with a faint narrow median vitta and shifting irregular broadly transverse spots along fore and hind margins, which in certain directions appear undusted. *Wings* greyish-hyaline with brown veins, r_1 with small black setulae on dorsal surface of intermediate, and sometimes also apical, part. Calyptrae whitish, sometimes slightly smoky, with whitish border and fringe. Halteres and anterior thoracic spiracle pale yellowish. *Legs* wholly fuscous-black; mid tibia with a strong *ad* seta.

Length.—8·0–8·7 mm., of wings 7·3–7·9 mm.

Distribution.—C. AND S. EUROPE. N. AFRICA. TRANSCAUCASIA. N. INDIA (Darjeeling).

The six Indian specimens examined are all females, and their abdomen is markedly less dusted than that of the few available European specimens, so it is quite possible that they represent a separate subspecies.

59. **Dasyphora cyanicolor kempi** ssp. nov.

♂ ♀ : *Head:* Eyes very sparsely hairy (under magnification of thirty-nine diameters), in male very closely approximated, but not contiguous, in female separated at vertex by two-thirds width of a single eye, anterior facets in male rather enlarged; frons obliterated in male, except anteriorly, in female reddish-brown, about four times width of one parafrontal; parafrontals very much reduced in male, touching for the greater part of their length, in female shining black on upper three-fourths, covered with silver tomentum anteriorly, bearing two pairs of fronto-orbitals, the anterior pair much stronger than the posterior; parafacials and face covered with grey tomentum, with reddish lights when viewed at certain angles; jowls brownish-black, black-haired; antennae and palpi black, third segment of antenna two-and-a-half times as long as second; ocellar bristles strong in female, weak in male; outer verticals absent in male; occiput with metallic-coloured reflections. *Thorax* shining green to purple, very slightly dusted anteriorly on dorsum where there are faint indications of stripes; 0+1 *acr*, 3+4 *dc*, 3 *ia*, 1+3 *stpl*; postalar declivity bare; anterior thoracic spiracle dark brown. *Abdomen* shining green to purple; fourth visible segment with a number of upstanding bristles, male hypopygium inconspicuous. *Wings* hyaline; basicosta dark brown; setulae on third longitudinal vein reaching far beyond small cross-vein; one or two setulae at base of first and second longitudinal vein both above and below. Squama dark brown. *Legs* dark brown.

Length.—8·0 mm.

Distribution.—INDIA: Kashmir, Gulmarg, 8,500 ft., summer 1913 (*F W Thomson*), ♂ type, 2♂ 3♀ paratypes (B.M.); Simla Hills, Bagli, 2 paratypes (Ind. Mus., Calcutta); above Kufri, 1 paratype (Ind. Mus.); N. Bengal, Darjeeling, 11.VI.26., in garden (*R. Senior White*), 1♂ paratype (B.M.) (*D. Aubertin*).

In addition Darjeeling, 23.V.17 (*E. Brunetti*), 2♂ (B.M.). Assam (Mishmi Hills, Delai Valley, Taphlogam, 5–6,000 ft., 10.X.36 (*M. Steele*), 1♀ (B.M.).

This form was originally considered to be a new species. However, since it differs from the Holarctic *D. cyanicolor* Zett. only by details of colouration (the calyptrae being whitish and the halteres pale reddish-yellow in the Holarctic form), it appears more logical to treat *kempi* as a subspecies of *cyanicolor*. The vertex of the female is 0·32–0·36 head-width

and there are four inconspicuous dorsal vittae in front of suture (*F v. E.*).

Sbg. **Rypellia** Malloch.

The only structural character which distinguishes all species of this subgenus from *Dasyphora* s. str. is the absence of an *ad* seta from the mid tibia. The vein r_1 is normally bare whereas it is normally setulose in *Dasyphora*, and the species are only slightly metallic. Like *Dasyphora* s. str. *Rypellia* differs from *Orthellia* by the absence of setulae from the suprasquamal ridge and from *Pyrellia* by the presence of two *ia*.

Distribution.—From BURMA eastward to FORMOSA and southward to JAVA.

60. **Dasyphora (Rypellia) malaisei** sp. n.

♂ ♀ : Wholly fuscous-black with a faint bluish tinge, thinly grey-dusted. *Head* with rather densely brownish-grey dusted face and anterior half of parafrontalia; eyes with dense long hair, contiguous in male, interfrontalia very narrow in front and behind, obsolete at middle, parafrontalia almost obsolete at middle, linear behind, half as wide anteriorly as antenna; frons of female over a quarter (0·27) head-width at vertex, evenly somewhat dilated to lunula, interfrontalia thrice as wide at middle as a parafrontale, the latter with only single setulose hairs in addition to the setae; width of jowls at least equal to length of third antennal segment. Antennae and palpi fuscous. *Thorax* thinly dusted with four very narrow faint undusted vittae, which are conspicuous only near neck where the pollinosity is denser; 0+1 *acr*, 3+4 *dc*, 3 marginal scutellars (and a setula at base). Anterior thoracic spiracle brown. *Abdomen* appearing undusted except in posterior view when very thin evenly distributed pollinosity becomes noticeable. *Wings* greyish-hyaline with dark brown veins, r_1 bare. Calyptrae brown, in male dark brown, including border and fringe. Halteres pale yellow. *Legs* fuscous; mid femur of male with four very long *av* and four moderately long *pv* setae from basal fourth to about middle, of female with one long *av* seta towards basal third and 4–5 moderately long *pv* setae from base to middle, mid tibia without an *ad* seta; hind tibia with 2–3 small *av* setae near middle and one at apical fifth or fourth.

Length.—5·5–5·7 mm., of wings 6·1–6·3 mm.

Distribution.—N.E. BURMA : Kambaiti, 7,000 ft., 11.V.34 (*R. Malaise*), ♂ type (Mus. Stockholm), 1 ♀ paratype (B.M.).

D. hervé-bazeni Sèguy from Tonkin appears to be very similar but differs by bare eyes and setulose under side of r_1.

61. **Dasyphora (Rypellia) flavipes** Malloch.

1931. ! *Rypellia flavipes* Mall., *Ann. Mag. n. H.* (10), **VII**, 190; 1932, *ibid.* (10), **X**, 305. Type: Gunung Singgalang. B.M., destroyed.

Bronze or copper-green or steel-blue with thin whitish (♂) or brownish-grey (♀) dust. *Head* fuscous-black with rather densely brownish-grey dusted face and anterior third of parafrontalia, parafacialia with a shifting dark spot at level of second antennal segment; eyes virtually bare, contiguous in male, where the upper facets are markedly enlarged, interfrontalia obsolete, parafrontalia almost obsolete at middle, linear behind, much narrower than third antennal segment in front; frons of female at vertex well over a quarter (0·28) head-width, very slightly dilated to lunula, interfrontalia nearly four times width of a parafrontale at middle, the latter with only single small setulose hairs in addition to the setae; width of jowls somewhat smaller than length of third antennal segment. Antennae and palpi fuscous. *Thorax* thinly dusted with four narrow faint undusted vittae, which are conspicuous only near neck, where the pollinosity is denser; 0+1 *acr*, 2+4 *dc*, 3 marginal scutellars. Anterior thoracic spiracle yellowish. *Abdomen* almost undusted. *Wings* greyish-hyaline, somewhat yellowish towards base, with brown veins; r_1 with a few scattered setulae on dorsal surface of middle (not apical) section (type) or bare. Calyptrae yellowish-smoky, in male brownish. Halteres pale yellow. *Legs* fulvous-yellow with infuscate coxae and tarsi; mid femur of male with two long *av* setae near basal third, of female with a small *av* seta at basal fifth, of both sexes with 3–4 *pv* setae near middle, mid tibia without an *ad* seta; hind tibia with 2–3 small *av* setae near middle and 1–2 near apical fifth.

Length.—6–7 mm., of wings 6·5–6·9 mm.

Distribution.—INDIA: Assam (Mishmi Hills). N.E. BURMA: Kambaiti, 7,000 ft. SUMATRA.

The type has two *pv* setae on the mid tibia and setulae on middle part of r_1, which setulae are believed to be abnormal.

Otherwise the present Assam and Burma specimens fit *flavipes* perfectly.

62. Dasyphora (Rypellia) flavipennis sp. n.

♀: Fuscous, the shoulders, lateral part of mesonotum (outward of the *ph*, *prst* and *ia*), scutellum, all or most of first abdominal segment and sometimes base of second, and legs pale testaceous; apex of fourth abdominal segment testaceous translucent. *Head* fuscous-black, facial ridges testaceous translucent, face grey-dusted, parafrontalia shining black, very thinly grey-dusted; eyes almost bare, frons at vertex (♀) well over a quarter (0·26–0·29) head-width, very slightly widened at anterior orbital and slightly narrowed to second or third frontal seta, where it is a trifle narrower than at vertex, frontal triangle fully reaching middle, interfrontalia slightly narrowed anteriorly and posteriorly, fully thrice as wide at middle as a parafrontale, the latter almost or entirely without setulose hairs except behind the proclinate setae; width of jowls markedly less than length of third antennal segment. Basal antennal segments brown with testaceous margins, palpi testaceous to brown. *Thorax* rather thinly dusted, moderately shining with bronze reflections on disc and with four faint undusted vittae, dust and vittae more conspicuous in front of suture and especially towards neck; 0+1 *acr*, 2+4 strong *dc*, a small third *prst* closely in front of the first sometimes distinct, 3 marginal scutellars. Anterior thoracic spiracle pale yellow. Pleurae testaceous along some of the sutures. *Abdomen* shining, hardly dusted; first segment with a narrow brown hind margin. *Wings* with a conspicuous yellow tinge on basal part, especially conspicuous up to *r-m* and apex of r_1, veins testaceous, becoming brown towards apex and hind margin, r_1 bare. Calyptrae strongly smoky-yellow. Halteres pale yellow. *Legs* including coxae and trochanters fulvous-yellow, tarsi somewhat browned; mid femur with 2–3 small *av* and *pv* setae on about basal half, mid tibia without an *ad* seta; hind femur with an *av* row, with 2–3 *pv* setae towards middle and some fine erect long setulose hairs between these and base, hind tibia with 3–4 small *av* setae on about intermediate third.

Length.—6·2–6·9 mm., of wings 6·0–6·6 mm.

Distribution.—MALAYA: Cameron Highlands, Pahang, 4,500–5,000 ft., 19.VI.35 (*H. M. Pendlebury*), ♀ type, 1 ♀ paratype (B.M.). N.E. BURMA: Kambaiti, 2,000 mtr., 6.IV.34 (*Malaise*), 4 ♀ paratypes (Mus. Stockholm, Mus. Helsinki, B.M.).

Genus 7. **Polietes** Rondani.

1866. *Polietes* Rond., *Bull. Soc. Milano*, IX, 91. Genotype: *Musca lardaria* F.
1929. sbg. *Pseudomorellia* Ringdahl, *Ent. Tidskr.*, L, 273. Genotype: *Musca albolineata* Fln.

Head with the eyes hairy, contiguous or subcontiguous in male, widely separated in female, where cruciate interfrontal and proclinate orbital setae are present, frontal triangle only slightly longer than ocellar tubercle; facial ridges setulose to well above middle; arista long-plumose; palpi and proboscis normal. *Thorax* with 3+3 *acr*, the rows less widely separated from each other than from the *dc*; 3+4 *dc*, 2(–3) *post ia*, *pra* distinct; scutellum with at least three strong marginals, a lateral marginal being present between the apical and subbasal ones; anterior mesopleural absent, often only 1+1 *stpl*, the other setae as usual; prosternum bare or setulose, propleural depression bare, pteropleura setulose, the setulae especially dense and long on upper embossed part, hypopleura bare. *Abdomen* ovate, short-ovate or heart-shaped, without any very strong setae; ventrobasal scale setulose. *Wings* with *sc* somewhat sinuate beyond its point farthest from *c*, the apical part strongly upcurved; r_{4+5} and *m* diverging to apex, the former at base with or (sbg. *Pseudophaonia* Mall.) without some setulae. *Legs* with the mid and hind tibiae rather richly setose, posterior surface of hind coxae bare.

Distribution.—EUROPE, NORTH AMERICA. As the genus has also been found in INDIA and N.E. BURMA, it must be expected to occur in large parts of N. and C. Asia.

Biology.—The biology and early stages of European species have been studied by Keilin and Tate (1930), Muirhead Thomson (1937) and O. Hammer (1941). The adults frequent very fresh dung and foliage nearby but also flowers. The eggs are deposited among grass roots close to the dung in small loose batches, they are similar to the eggs of *Musca*. The first larval instar is coprophagous, the second and third at least occasionally carnivorous, though it may be reared entirely with dung. Larvae of *P. albolineatus* are said (Keilin and Tate, 1930, *Parasitology*, XXII, p. 173, quoting Portshinsky) to feed on those of *Haematobia*, *Musca*, *Hydrotaea*, *Mesembrina* (MUSCIDAE) and *Borborus* (BORBORIDAE), but Hammer (1941, *Vidensk. Medd. Dansk nathist. For.*, CV, p. 8) has reason to consider them as coprophagous.

The only species so far found in the ORIENTAL REGION

has the prosternum bare and the node at the base of r_{4+5} setulose and thus belongs to sbg. *Pseudomorellia*. It is in fact so closely related to the European *P. albolineatus* that it appears safe to consider it a subspecies of that species.

63. **Polietes (Pseudomorellia) albolineatus fuscisquamosus** ssp. n.

♀ : Black with some silver-white and brownish dust. *Head* black, the silver dust in female with a large spot of dark reflections on upper half of parafacialia; eyes densely long-haired (in male of type form almost contiguous, the interfrontalia obsolete at middle), in female vertex almost three-tenths (in type form more than a third) head-width, inclinate frontal setae reaching half-way to level of ocelli, some setulose hairs continuing the row, which ends in 2–3 short reclinate setae at level of ocelli; (in male ocellars and inner verticals long and fine, outer verticals absent), in female ocellars and inner verticals strong, outer ones less strong; palpi and antennae fuscous, aristal rays somewhat longer than in type form. *Thorax* silver-dusted on and behind shoulders, and on *prst* part of median vitta, more thinly grey-dusted on *post* part of median vitta, which in ssp. *fuscisquamosus* is hardly as wide as the distance between the *acr* rows, the resulting two broad black vittae in posterior view with a more pronounced indication of a dividing vitta of brownish dust at the *dc* than in type form; scutellum thinly grey-dusted on dorsum. *Abdomen* fuscous with some grey dust on basal part of each segment, this dust leaves a broad median vitta and broad hind margins on the intermediate segments dark (much broader and more conspicuous than in the type form), the dark hind margins broader at sides and there coalescing, or tending to coalesce, with a small dark area at base of laterodorsal surface; fourth segment with a wedge-shaped silver-dusted spot on each side of median vitta, and with an elongate or 2 small pale-dusted spots along lateral margin. *Wings* with some setulae at base of r_{4+5}; *m-m* somewhat less oblique than in type form. Calyptrae fuscous-brown, including margin and fringe. Halteres reddish-yellow. *Legs* piceous; fore tibia with 2–3 small *ad* and, towards apical third, a *pv* seta; mid tibia with a strong *ad*, 3–5 short *p* and one strong *pv* seta; hind tibia with a rather strong *pd* seta beyond basal quarter, a strong *pd* at apical third, 3–4 small *av* in more than apical half and an *ad* row of short setulae, among these setulae 1–3 stronger ones.

Length.—7·4–7·6 mm., of wings 6·0–6·7 mm.

Distribution.—N. INDIA: nr. Ghoom, Darjeeling dist., 6,000–7,000 ft., 11.V.14 (*F. H. Gravely*), ♀ type (Indian Mus., Calcutta); Chhangla Gali, Abbotabad dist., 8,450 ft., W. PAKISTAN, 3.X.28 (*H. S. Pruthi*), 1 ♀ paratype (in B.M.). N.E. BURMA: Kambaiti, 2,000 m., 8.IV.34 (*R. Malaise*), 1 ♀ paratype (in Mus. Stockholm).

Distinct from the European form by dark calyptrae, the less extended pale pollinosity, especially of the abdomen, and narrower frons of the female.

Subfamily *STOMOXYDINAE.*

Lower calyptra rounded at apex, the free part of its inner margin diverging from side margin of scutellum in its whole length, shape subtriangular to semicircular (Pl. 1, fig. 9). Proboscis with the mentum and labella heavily sclerotized and often not defined from each other, at least as long as the head (Figs. 33, 35 and 42), strongly tapering to apex, and usually with conspicuous prestomal teeth. Pteropleura setulose on upper part. Vein *m* broadly rounded forward in apical section. Frons in male much narrower than in female (in Oriental species).

The subfamily has often been united with the *MUSCINAE* because of the formation of *m*, but it is now known that this character occurs in many undoubted *PHAONIINAE*, and that on the other hand certain *MUSCINAE* (*Polietes*) have *m* straight. The hairy pteropleura is found in *MUSCINAE* but also in certain *PHAONIINAE* (e.g. the large genus *Dichaetomyia*), and the lower calyptra is that of *Phaonia*.

The Oriental forms were revised by Brunetti (1910, *Rec. Ind. Mus.*, IV, 59) and Malloch (1932, *Ann. Mag. n. H.* (10), IX, 377, 501), and Zumpt (1940, *Zschr. angew. Ent.*, XXVII, 126) studied their synonymy.

The Tsetse flies (*Glossina*), which are now confined to the ETHIOPIAN REGION, deviate slightly from the above definition in the last two characters of the above diagnosis, but even more in the formation of the arista and abdomen, biology, etc. They are therefore sometimes placed in a separate subfamily (or even family). As the more important deviations from Stomoxydinae can probably be explained by the reproductive peculiarities of *Glossina*, the merits of a separation are doubtful.

Distribution.—World-wide, but in the southern part of the NEOTROPICAL REGION represented only by the cosmopolitan *Stomoxys calcitrans*.

Biology.—Adults piercing the skin and sucking the blood of cattle, buffaloes, zebu, camels, horses and man, the latter being attacked mainly by *Stomoxys*. The place and time of attack differ widely according to genus and species. The eggs are laid on dung, and all three larval stages feed on dung. The transformation also occurs in the dung.

Egg: The eggs have been described on pp. 11–13. Kano (1953, *Japan. J exp. Medic.*, **XXIII**, 188) has keyed the eggs of four Oriental species, and that of *Haematobia sanguisugens* has been made known by Mitter (*see* pp. 15–21), whereas Patton (1914) says that the egg of *Stygeromyia* is very similar to that of other Stomoxydinae (and, therefore, presumably white like that of *Stomoxys*). As will be seen the eggs of sbg. *Haematobia* and sbg. *Bdellolarynx* differ strikingly in colouration, and this, in connection with the larval differences, may suggest that these two subgenera are less closely related than the present classification of the adults suggests. Kano's key, somewhat modified to include sbg. *Haematobia* and *Stygeromyia,* is this:

1	(6)	Eggs whitish (*Stygeromyia* will probably fall under this alternative).	
2	(3)	Length 1·3–1·4 mm.	*Haematobia* (s. str.) *sanguisugens* Aust.
3	(2)	Length *c.* 0·85–1·25 mm., width 0·23 mm..	*Stomoxys* Geoffr.
4	(5)	Area between the ribs at middle about one-quarter width of egg...	*Stomoxys calcitrans* L.
5	(4)	Area between the ribs at middle about one-third width of egg....	*Stomoxys indica* Pic.
6	(1)	Eggs brown or blackish. Length 1·2–1·3 mm.	
7	(8)	Area between the ribs at middle about one-third as wide as egg, slightly broadened at one end.	*Lyperosia exigua* Meij.
8	(7)	Area between the ribs at middle about one-sixth as wide as egg, strongly broadened at one end ...	*Haematobia* (*Bdellolarynx*) *sanguinolenta* Aust.

Larva: Kano (l.c.) published keys to all three larval instars, and that to the third instar is reproduced below with certain modifications and the addition of the data concerning *Stygeromyia,* sbg. *Glossinella* and *Haematobia* s. str. It is interesting to know that, as in the egg stage, *Haematobia* s. str. joins the *Stomoxys* group in the characters of all three

larval stages and not the group to which sbg. *Bdellolarynx* belongs, although the characters for the separation of the adults are very slight in the present stage of our knowledge.

1	(8)	Posterior spiracles separated by more than their own width, slits at the most S-shaped.	
2	(3)	Slits of posterior spiracles almost straight (Fig. 11*j*). Left mouth-hook almost as long as right one.	*Stygeromyia maculosa* Aust.
3	(2)	Slits of posterior spiracles S-shaped. Left mouth-hook much shorter than right one.	
4	(5)	The terminal half of the wider loop of the S-shaped slits only very gently concave (Fig. 11*f*); length of spiracular plate smaller.* Anterior spiracle with five buds. Full-grown larva 7–8 mm. long.	*Haematobia* (s. str.) *sanguisugens* Aust.
5	(4)	The terminal half of the wider loop sharply bent, doubled back (Fig. 11*e*); length of spiracular plate somewhat greater. Full-grown larva 8–11 mm.. ...	*Stomoxys* Geoffr.
6	(7)	Anterior spiracle with about 5 buds.	*S. calcitrans* L.
7	(6)	Anterior spiracle with 3 buds	*S. indica* Pic.
8	(1)	Posterior spiracles separated by at most their own width, usually less than half that width. Anterior spiracles with 4–6 buds. Slits often with secondary sinuosities.	
9	(10)	Anterior spiracles with rather long finger-like buds. Posterior spiracles (Fig. 11*g*) small, separated by a quarter their own width.	*Haematobia* (*Bdellolarynx*) *sanguinolenta* Aust.
10	(9)	Anterior spiracles with short buds.	
11	(12)	Posterior spiracles small and separated by at least half their own width; slits with secondary sinuosities (Fig. 11*i*)*.	*Lyperosia* (*Glossinella*) *titillans* Bezzi
12	(11)	Posterior spiracles large and separated by about a quarter their own width; slits with secondary sinuosities.	*Lyperosia* (s. str.) *exigua* Meij.

* *Lyperosia* (*Glossinella*) *titillans* is somewhat intermediate between the two groups, and it is possible that sbg. *Glossinella* will have to be placed in the former group when the egg and more species become known.

Key to the Genera of STOMOXYDINAE

1	(4)	0+1 *stpl*, anterior one absent. Propleural depression and hypopleura, at least on dorso-anterior embossed part, with erect setulose hairs. Arista with long hairs on upper side only. Inner surface of palpi not glossy and at most shallowly excavate.	
2	(3)	Palpi about as long as proboscis (mentum + labella), strongly widened towards apex (Fig. 33), inner surface shallowly excavate. Hind margin of eye not or hardly emarginate.	*Stygeromyia* Aust., p. 153
3	(2)	Palpi less than half as long as proboscis, thread-like (Fig. 35). Hind margin of eye conspicuously emarginate	*Stomoxys* Geoffr., p. 156
4	(1)	1+1 *stpl*, anterior one well-developed. Propleural depression and hypopleura bare.	
5	(6)	Palpi less than half as long as proboscis, thread-like, inner surface not glossy. Arista with long rays both above and below ...	*Haematostoma* Mall., p. 167
6	(5)	Palpi about as long as proboscis (mentum + labella), markedly widened towards apex, the inner surface concave and glossy.	
7	(8)	Arista with long rays both above and below (Fig. 42). Lateral margins of prosternum with black setulose hairs. ♂: Hind tarsi simple..... .	*Haematobia* Lep., p. 168
8	(7)	Arista with long rays on upper side only, underside appearing bare. Prosternum with pale yellow setulose hairs or bare. ...	*Lyperosia* Rond., p. 175

Genus 8. **Stygeromyia** Austen.

1907. *Stygeromyia* Austen, *Ann. Mag. n. H.* (7), **XIX**, 445; Brunetti, 1910, *Rec. Ind. Mus.*, **VI**, 82; Patton and Cragg, 1913, *Textb. Med. Ent.*, 371; Malloch, 1932, *Ann. Mag. n. H.* (10), **IX**, 379, 433; Zumpt, 1939, **VII**, *intern. Kongr. Ent.*, 1731; 1950, *An. Inst. Med. trop.*, **VII**, 398, 416. Genotype: *maculosa* Aust.

1937. *Lyperosia* Rond. (pars.), Sèguy, *Gen. Ins.*, **205**, Muscidae, 439.

Head with large vertically-elongate eyes, the hind margins of which are straight or almost so (Fig. 33), jowls largely pushed to underside of head, appearing very narrow in a

strictly lateral view; frons of male narrow, of female moderately wide, interfrontalia well developed but not broad, without cruciate setae, frontal triangle short, parafrontalia well defined, apart from the row of frontal setae bare (♂) or with proclinate dark setulae and on upper half 2–3 proclinate setae (♀); ocellars fine but distinct, inner and outer verticals distinct or strong; face deeply excavate, and vibrissal angles somewhat produced. Arista long, pectinate above, bare below. Proboscis only slightly longer than head, rather stout; palpi laterally compressed and clavate, inner surface shallowly excavate and not shining. *Thorax* with 0+1 *acr*, more than 2+4 *dc*, but only 2 *prst* and the last 2–4 *post dc* strong, 1 *ia*; 1 *ph*, 1 *prst*, 2 *npl*, no *pra*, 1 *sa*, 2 postalars; propleural distinct but weak, prostigmal small or indistinct, anterior mesopleural present, 0+1 *stpl*, prosternum, propleural depression, posterior half of pteropleura and upper and central part of hypopleura (both the anterior embossed portion and the area between it and the hind coxa) with erect black setulose hairs. *Abdomen* without setae, the decumbent hair somewhat longer on hind margins, especially laterally, fourth segment with erect fine hairs. *Wings* almost evenly haired, veins bare except for some minute setulae on both surfaces of r_{4+5} from base to *r-m* or slightly beyond, *m* broadly but strongly curved forward near middle of last section, the apical cross-vein largely straight (Fig. 34), apex of R_5 somewhat narrower than base. *Legs* rather slender, without secondary sexual distinctions; tibiae without submedian setae, hind tibiae with an inconspicuous fringe of short *ad* and *pd* setulae; mid and hind femora with a row of long erect *v* setulae on basal half, hind femur with 1(–2) strong *av* pre-apicals.

Distribution.—S. INDIA. S. ARABIA. E. and S.E. AFRICA (BRIT. SOMALILAND and SUDAN to TRANSVAAL). Only one species in the ORIENTAL REGION.

Biology.—Adults found biting cattle and mules at dusk; they also attack camels and man. In resting position the wings are crossed one over the other as in *Glossina*. Oviparous; larvae in horse and mule manure (Patton, 1914; Mitter, 1915).

64. **Stygeromyia maculosa** Austen.

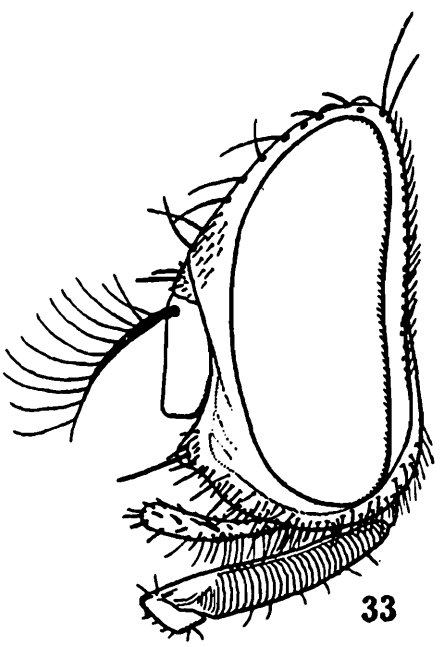
(Figs. 33, 34)

1907. *Stygeromyia maculosa* Austen, *Ann. Mag. n. H.* (7), **XIX**, 447; Patton and Cragg, 1913, *Textb. med. Ent.*, 372; Patton, 1914, *Ind. J. med. Res.*, II, 349, Pl. 42; Mitter,

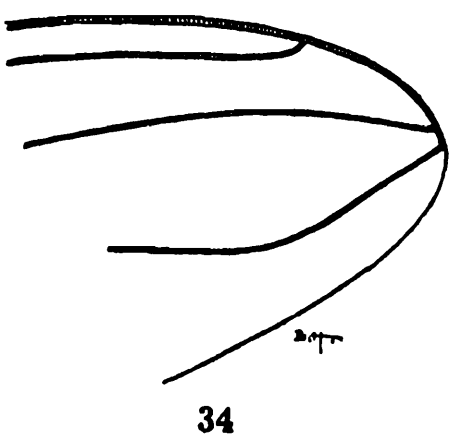
1915, *Ind. J. med. Res.*, **III**, 395 (biology); Brunetti, 1917, *Rec. Ind. Mus.*, **XIII**, 91; Cuthbertson, 1939, *Trans. Rhodesia sci. Ass.*, **XXXVII**, 144 (biology); Zumpt, 1950, *An. Inst. Med. trop.*, **VII**, 400. Type: Little Aden. B.M.

1910. *Lyperosia rufipalpis* Becker, *Denkschr. K. Akad. Wien.*, **LXXI**, 148. Type: Ras Fartak. Mus. Vienna.

Fuscous-black with dense whitish-grey dust and fuscous-brown-dusted thoracic vittae and abdominal spots. *Head* fuscous with dull orange clypeus and epistoma, densely dusted, the dust in places somewhat golden-grey, interfrontalia black to dull red, almost parallel-sided, eyes in male separated by $\frac{1}{6}$–$\frac{1}{7}$ head-width, parafrontalia half to fully as wide as interfrontalia, with about 10 inclinate and, at level of anterior ocellus, two small proclinate setae; vertex in female three-tenths head-width, parafrontalia at middle about $\frac{2}{3}$–$\frac{3}{4}$ width of interfrontalia; face strongly



33



34

FIG. 33. *Stygeromyia maculosa* Aust., head of male, side view.

FIG. 34. *Stygeromyia maculosa* Aust., wing tip.

widened to lower extremity of eye where it is two-thirds to almost three-quarters head-width; inner margin of eyes somewhat concave at level of vibrissae. Antennae orange, third segment largely fuscous; palpi pale orange; proboscis dark brown. *Thorax* rather densely dusted whitish-grey, with five narrow fuscous, brown-dusted vittae, the median one not exceeding suture in front but often continued on basal part of scutellum, the paramedian ones extending from neck to antipenultimate *dc* and very narrowly interrupted at suture, the outer ones reaching level of penultimate *dc*

behind, broadly interrupted at suture, and continued by an oblique spot towards or to the posthumeral seta. *Abdomen* with a row of narrow elongate median spots, which may form an almost continuous median vitta or which may not be distinct on the fourth segment; intermediate segments on each side with a somewhat transverse spot close to hind margin, fourth with a roundish or longitudinal spot at middle of each lateral half; fourth segment of female from almost two-thirds to almost fully as long as wide at base. *Wings* subhyaline with a slight brownish tinge and light-brown veins. Calyptrae whitish-grey. Halteres dull reddish-yellow. *Legs* pale reddish-yellow, the coxae, femora and tarsi infuscate, apex of tibiae also sometimes slightly darkened.

Length.—5·7–7·3 mm., of wings 5·5–6·7 mm.

Distribution.—S. INDIA: Guindy, Madras. N. INDIA: Kasauli, Simla Hills. ARABIA. E. AFRICA.

One of Patton's specimens is now in the B.M. It shows that the strongly sinuate hind margin of the eye in his Fig. 3 (1914) is incorrect.

Genus 9. **Stomoxys** Geoffroy St. Hilaire.

1762. *Stomoxys* Geoffr., *Hist. Ins.*, II, 538; Fabricius, 1775, *Syst. Ent.*, 797. Genotype: *Conops calcitrans* L. designation Latreille, 1810.

Head with large vertically-elongate eyes, the hind margin of which is broadly and deeply emarginate (Fig. 35) jowls largely pushed to underside of head, appearing very narrow in a strictly lateral view; frons of male much narrower than of female; interfrontalia without cruciate setae, parafrontalia in male with only the row of inclinate setae, in female in addition on upper half with two proclinate orbitals and two small setae which are curved outward and backward; inner verticals well developed, ocellars and outer verticals well developed in female, small to indistinct in male; parafacialia bare, facial ridges bare except for some setulae close to vibrissae, the latter level with mouth-margin, vibrissal angles somewhat produced, face rather deeply excavate. Arista long pectinate above, bare below. Proboscis slender and very long, mentum, including labella, about twice as long as head and a third longer than height of head; palpi filiform and shorter than length of head. *Thorax* with 0+1 *acr*, more than 2+4 *dc*, but only 1–2 *prst* and the last 2–3 *post* ones conspicuous; 1 *ph*, 1 *prst*, 2 *npl*, no *pra*, 1 *sa*, 2 postalars; propleural, prostigmal and anterior mesopleural distinct, 0+1 *stpl*; prosternum, propleural depression, pteropleura

(posterior half) and hypopleura (upper anterior part, especially the embossed portion) with erect black setulose hairs. *Abdomen* short and subcircular or short-ovate, without setae, the decumbent hairs somewhat longer on hind margins, especially laterally, fourth segment with more erect hairs, especially in male. *Wings* almost evenly haired, veins (in Oriental species) without setulae, except for part or all of r_{4+5}; *m* broadly bent forward at or beyond middle of last section, R_5 rather broadly open at apex, where it is conspicuously wider than at base (Fig. 36). *Legs* rather slender, tibiae without submedian setae; hind femur with or without setulose hairs on *v* surfaces and with 1(–2) strong *av* pre-apicals.

Distribution.—The type species is cosmopolitan otherwise the genus is restricted to the ETHIOPIAN and ORIENTAL REGIONS.

Biology.—Both sexes are haematophagous and are of veterinary and medical importance not only as a nuisance but by transmitting germs. They are, however, not indispensable hosts of these. The adults feed only during daytime. The eggs are deposited singly or in small batches on excrements of cattle and to a smaller extent other domestic animals. All stages of the larva feed on excrements, especially when these are loosened by admixture of straw, and other decaying vegetable matter. In *S. calcitrans* transformation from egg to adult is completed in 10 (at 33·1° C.)–52 (at 16·2° C.) days and requires slightly longer at higher temperatures (Thomsen, M., 1938, *Stuefluen og Stikfluen*. Copenhagen).

Key to the Species of Stomoxys

1 (2) Setulae at base of r_{4+5} not reaching *r-m* (Fig. 36). Frons wide, in male twice, in female up to one-and-a-half times, as long as wide at vertex. Hind femur with some half-erect short spinulose setulae near middle of *av* surface. Abdomen (Fig. 37) in posterior view with a broad dark grey median vitta and similar fore and hind margins, a brown-dusted spot on anterior part of median vitta and a roundish spot on each side near hind margin of intermediate segments. ♀: Proclinate setulae

on upper part of parafrontalia arranged in several irregular rows. *calcitrans* (L.), p. 160

2 (1) Setulae at base of r_{4+5} exceeding *r-m* (Pl. 1, figs. 6–8). Frons much narrower than in the corresponding sex of *calcitrans*. Hind femur without half-erect spinulose setulae near middle of *av* surface.

3 (8) Articulation between second and third antennal segments at least narrowly reddish-orange. Thorax always largely grey-dusted. Palpi not reaching fore margin of mouth. ♂: Fore tarsi evenly short-haired.

4 (5) Median vitta on intermediate abdominal segments indistinct or formed by brown dust; brown-dusted spots forming a complete band on hind margin of second and third or only second segment (Fig. 38). Tarsi and tibiae pale ferruginous. R_5 at widest part not or hardly more than twice as wide as at apex, *m* only slightly more upcurved than r_{4+5} is downcurved at apex, hardly sinuous. Hind femur at base of *v* surface with at most one long setulose hair, even this not longer than femoral diameter (except in f. *pratti*). ♂: Frons about one-eighth ($\frac{1}{7}$–$\frac{1}{9}$) head-width. Wing 4·0–5·4 mm. . . . . *indica* Pic., p. 161

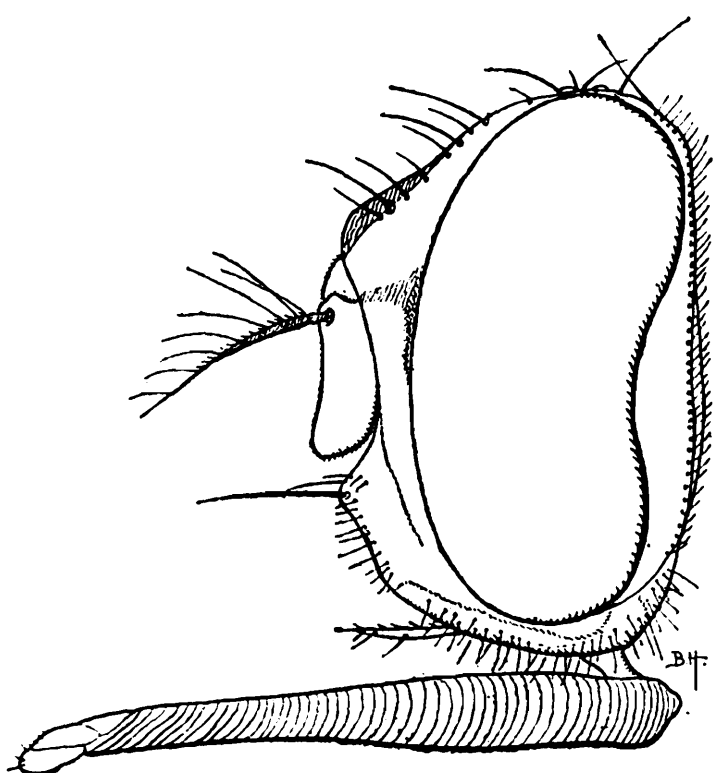
5 (4) Median vitta on intermediate abdominal segments (posterior view, Fig. 39) rather broad, dark grey, less dusted, though overlaid with brown dust anteriorly (pattern much as in *calcitrans*). Tarsi infuscate. R_5 at widest part markedly more than twice as wide as at apex, *m* more strongly upcurved and sinuous at apex (Pl. 1, figs. 7, 8).

6 (7) Level of apex of *m* as close to apex of wing as apical level of r_{4+5} (Pl. 1, fig. 7). 4–6 setulose *v* hairs on basal part of hind femur fully or almost as long as its diameter. Large species of more than 6 mm. wing length. . . . . *bengalensis* Pic., p. 163

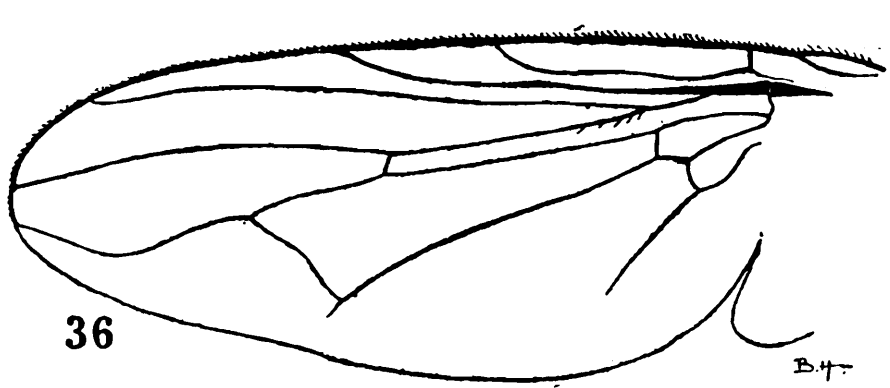
7 (6) Level of apex of *m* farther from apex of wing than apical level of

r_{4+5} (Pl. 1, fig. 8). The setulose hairs on basal part of hind femur apart from the first seldom exceeding half the length of the femoral diameter. Medium-sized species of 5–6 mm. wing length. ... *dubitalis* Mall., p. 165

8 (3) Antennae wholly fuscous. Thorax without grey dust (♂ only?), or dark brown with some brown dust. Palpi exceeding fore margin of mouth. Small species of under 5 mm. ♂: Basal two segments of fore tarsi with a row of curved erect *ad* hairs (Fig. 40). *pulla* Aust., p. 166



35



36

FIG. 35. *Stomoxys calcitrans* (L.), head of male, side view.
FIG. 36. *Stomoxys calcitrans* (L.), wing.

65. **Stomoxys calcitrans** (Linnaeus).

(Figs. 35–37)

1758. *Conops calcitrans* L., *Syst. Nat.* (ed. 10), 604. Type: Sweden. Linn. Soc. London.

Fuscous-black with whitish-grey or cinereous-grey pollinosity and some brown dust on the dark thoracic vittae and forming spots on abdomen. *Head* densely silver-grey dusted on face and parafrontalia; eyes in male separated by a quarter head-width or somewhat more (0·24–0·28), frons very slightly narrowed from vertex to middle, moderately dilated from there to lunula, interfrontalia parallel-sided, slightly narrowed at extremities, 4–6 times as wide at middle as a parafrontale, the latter with a row of 8–12 rather fine inclinate setae on anterior two-thirds and numerous long somewhat proclinate setulae on upper third or more; in female frons well over a third (0·36–0·38) head-width at vertex, nearly one-half (0·44–0·47) head-width at lunula, interfrontalia 2·5–3 times width of a parafrontale at middle, considerably narrowed to both ends, ocellar triangle produced to about anterior fifth, parafrontalia with about 8 pairs of moderately strong inclinate setae on anterior two-thirds and a group of proclinate setulae on more than upper third with two somewhat stronger proclinate setae behind middle of frons. Antennae fuscous-brown, apex of second and base of third segment dull reddish-orange. Palpi yellowish-orange, only slightly longer than third antennal segment, not reaching fore margin of mouth. *Thorax* with four fuscous vittae, which are somewhat brown-dusted, the space between the vittae on either side with darkish pollinosity, the paramedian ones narrowly connected along suture, slightly converging to neck, outer ones diverging from suture forward. *Abdomen* with a moderately broad less densely dusted and darker median vitta and similar fore and hind margins, the median vitta with concave margins; some brown dust on a subtriangular or oblong-trapezoidal median spot on segments 2–4 and on a roundish or transverse spot near hind margin on each side of the second and third. *Wings* with the setulae on r_{4+5} not nearly reaching *r-m*, *m* strongly upcurved and distinctly sinuous near apex, R_5 much wider at apex than at base. *Legs* fuscous with pale testaceous knees; base of hind femur with only one long hair, which seldom reaches length of femoral diameter, often with 2–3 shorter hairs following upon the long hair, hairs of the *av* row somewhat stronger and more erect, spinulose on intermediate part.

Length.—3·5–6·3 mm., of wings 4·0–6·2 mm.

Distribution.—World-wide, including all parts of the ORIENTAL REGION.

66. **Stomoxys indica** Picard.

(Fig. 38, Pl. 1, fig. 6)

1908. *Stomoxys indica* Pic., *Bull. Soc. ent. France.*, **XX**, 20; Brunetti, 1910, *Rec. Ind. Mus.*, **IV**, 77; Malloch, 1932, *Ann. Mag. n. H.* (10), **IX**, 384, 387, 422; Zumpt, 1940, *Zschr. angew. Ent.*, **XXVII**, 134. Types: near Calcutta.

1909. *Stomoxys brunnipes* Grünb. of Stein, *Tijdschr. Ent.*, **LII**, 219 (nec Grünberg).

1909. ! *Stomoxys limbata* Austen, *Ann. Mag. n. H.* (8), **III**, 292. Types: Calcutta; Sylhet; Paradeniya. B.M.

1909. ! *Stomoxys pusilla* Austen, *Ann. Mag. n. H.* (8), **III**, 293. Type: Allahabad. B.M.

1910. *Stomoxys triangularis* Brunetti, *Rec. Ind. Mus.*, **IV**, 77; Zumpt, 1940, *Zschr. angew. Ent.*, **XXVII**, 135. Types: Travancore. Indian Mus., Calcutta.

1911. ! ssp. ? *pratti* Summers, *Ann. Mag. n. H.* (8), **VIII**, 238. Types: Kuala Lumpur. B.M.

1935. *Stomoxys latipennis* Karl, *Arb. morph. tax. Ent.*, **II**, 30; Zumpt, 1940, *Zschr. angew. Ent.*, **XXVII**, 134. Type: Formosa: Koozan. Deut. Ent. Institut.

Fuscous-black with cinereous-grey and brown dust. *Head* with the face and parafrontalia densely dusted pale golden-grey; eyes in male separated by about one-eighth head-width (0·11–0·15), frons markedly narrowed from vertex to middle, and considerably widened from there to lunula, sides concave, interfrontalia narrowest at or above middle, where they are 2–3 times width of a parafrontale, the latter with 6–8 fine inclinate setae on anterior three-fifths and with three fine proclinate setae on posterior two-fifths; frons in female one-third head-width at vertex, less than two-fifths (0·36–0·38) head-width at lunula, interfrontalia almost evenly widened forward, at middle 2·5–3 times width of a parafrontale, ocellar triangle not produced, not reaching middle, parafrontalia with about 6 inclinate setae and, on upper half, 2–3 proclinate and 2–1 small outwardly-bent setae; ocellars and inner and outer verticals small but very distinct in female, very small in male. Antennae browned, tip of second and base of third segment reddish-orange. Palpi yellowish-orange, as long as third antennal segment, not reaching fore margin of mouth. *Thorax* with four fuscous vittae, which are brown-dusted on margins, the inner ones very narrow, parallel and very broadly separated, the outer ones broader, strongly diverging from suture forward, but in female rather

faint. *Abdomen* rather densely dusted grey, the anterior three segments with a brown-dusted median vitta, which becomes narrower on the posterior segments and is sometimes

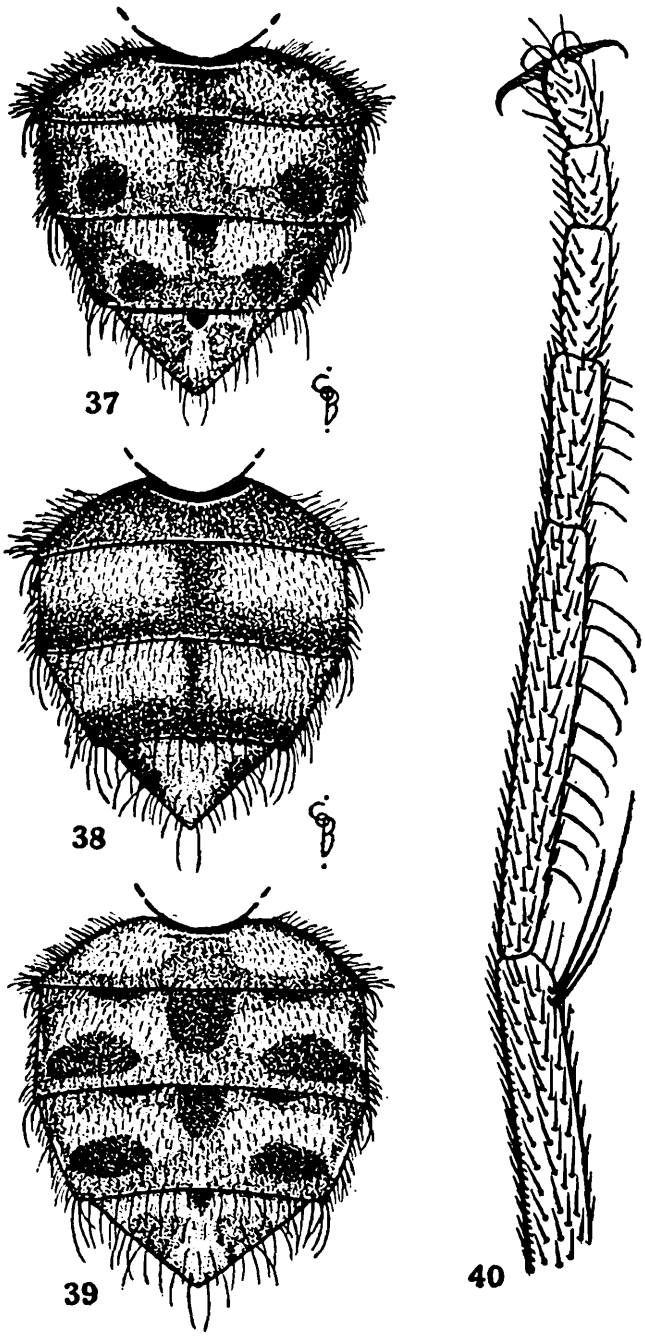


FIG. 37. *Stomoxys calcitrans* (L.), abdomen of female.
FIG. 38. *Stomoxys indica* Pic., abdomen of female.
FIG. 39. *Stomoxys dubitalis* Mall., abdomen of female.
FIG. 40. *Stomoxys pulla* Aust., fore tarsus of male.

faint, the anterior three segments brown-dusted, with the hind margins broadly dark brown, the posterior three segments usually with the fore margins narrowly brown; the

hind marginal bands sometimes interrupted on median line, especially on third segment, but the resulting spots much more transverse than in *calcitrans*. *Wings* (Pl. 1, fig. 6) somewhat brownish tinged; r_{4+5} setulose to well beyond *r-m*; *m* only moderately upcurved at apex and hardly sinuous, r_{4+5} almost as much downcurved as *m* is upcurved; R_5 at widest part not, or hardly, more than twice as wide as at apex. *Legs* piceous-brown with testaceous tibiae and tarsi (in var. *latipennis* Karl femora also pale ferruginous); base of hind femur at most with a single *v* seta, which is not longer than femoral diameter, the following setulae less than half length of femoral diameter.

Length.—4·0–5·5 mm., of wings 4·1–5·4 mm.

Distribution.—CEYLON. INDIA (S. India; U.P. (Uttar Pradesh); Bengal; Assam). BURMA. MALAYA. SUMATRA. JAVA to FIJI. FORMOSA (Zumpt). PHILIPPINES (Zumpt) and CHINA (Zumpt).

Biology.—Found on cattle.

The specimens described by Summers as *pratti* tally with *indica* in every detail of colouration, etc., but the long *v* hair at the base of the hind femora is almost twice the length of the diameter of this part of the femur, and the hairs following upon it are erect and not or not much shorter than the femoral diameter. Specimens with these characters have been collected repeatedly in Kuala Lumpur, in Sumatra and Java and may be more than fluctuating varieties of *indica*, especially since the two forms have never been found in one collection and since the frons of the *pratti* females (but not of mature males) is distinctly narrower than that of typical females from Kuala Lumpur (0·3–0·31 times head-width at vertex and 0·35 times at lunula against 0·32 and 0·38 respectively). Possibly *pratti* represents a mountain form.

67. **Stomoxys bengalensis** Picard.

(Pl. 1, fig. 7)

1908. *Stomoxys bengalensis* Pic., *Bull. Soc. ent. France.*, **XX**, 21; Brunetti, 1910, *Rec. Ind. Mus.*, **IV**, 79; Malloch, 1932, *Ann. Mag. n. H.* (10), **IX**, 424; Zumpt, 1938, *Zschr. angew. Ent.*, **XXV**, 338; 1940, *ibid.*, **XXVII**, 132. Type: near Calcutta.

1910. *Stomoxys oblongopunctata* Brun., *Rec. Ind. Mus.*, **IV**, 73. Type: Sylhet. Indian Mus., Calcutta.

Fuscous-black with pale grey and brown dust. *Head*

with face and parafrontalia dusted pale golden-grey or silver-grey; eyes in male separated by almost one-fifth (0·18–0·19) head-width, frons very slightly narrowed from vertex to middle and slightly widened from there to lunula, interfrontalia virtually parallel-sided, twice width of a parafrontale at middle, the latter with about 12 fine inclinate setae on lower three-fourths and rather numerous proclinate setulae in two irregular rows on more than upper third, some of them as strong as the inclinate setae; frons of female a third head-width at vertex, almost or fully two-fifths (0·36–0·44) head-width at lunula, interfrontalia almost two-and-a-half times width of a parafrontale at middle, somewhat narrowed at extremities, frontal triangle almost reaching middle, parafrontalia with 8–10 inclinate setae on more than anterior two-thirds and with numerous strong proclinate setulae on more than upper third, two of them somewhat stronger. Antennae fuscous-brown, the articulations reddish-orange. Palpi yellowish-orange, as long as antennae, not quite reaching fore margin of mouth. *Thorax* with four fuscous vittae, the margins of which are somewhat brown-dusted, the space between the vittae of each side very narrow and with darkish pollinosity, paramedian vittae narrow, not or slightly converging to neck, outer ones much broader, strongly diverging from suture forward. *Abdomen* in posterior view with a moderately broad less dusted fuscous-grey median vitta, which is broadened at base and often along hind margin, but which sometimes does not reach the latter, often (especially in ♀) a more or less broad hind margin and sometimes a narrower fore margin of the same colour, a broad hind margin, a narrower fore margin and the greater anterior part of the median vitta more or less dusted brown. *Wings* (Pl. 1, fig. 7) with the setulae on r_{4+5} extending to well beyond *r-m*, *m* rather strongly upcurved and distinctly sinuous in apical part, R_5 at widest part 2·5–3 times as wide as at apex, apices of r_{4+5} and *m* at equal distance from apical level of wing. *Legs* fuscous with the knees and tibiae pale testaceous, apex of the latter more or less distinctly browned; base of hind femur with 4–6 *v* setulae which are not or hardly shorter than the diameter of the femur.

Length.—6·5–7·3 mm., of wings 6·3–7·0 mm.

Distribution.—N.E. INDIA (Bengal; Calcutta area; Assam: Sylhet). BURMA (Rangoon). ANNAM (Hue). MALAYA (Kuala Lumpur; Pahang). JAVA.

68. **Stomoxys dubitalis** Malloch.

(Fig. 39, Pl. 1, fig. 8)

1932. ! *Stomoxys dubitalis* Mall., *Ann. Mag. n. H.* (10), **IX**, 426; Zumpt, 1940, *Zschr. angew. Ent.*, **XXVII**, 130. Types: Upper Perak; Guindy; Hong Kong; Tengyueh. B.M.

Fuscous-black with dense pale grey and brown dust. *Head* with the face dusted silver-white and the parafrontalia pale golden-grey; eyes separated in male by less than one-sixth (0·15–0·16) head-width, frons markedly narrowed from vertex to beyond middle and widened from there to lunula, interfrontalia slightly narrowed at middle, where they are twice as wide as a parafrontale, the latter with a row of 8–10 inclinate setae on lower two-thirds, this row continued by the proclinate setulae in virtually single file on upper third; frons of female just over a third head-width at vertex, two-fifths head-width or slightly wider (0·39–0·43) at lunula, interfrontalia almost thrice width of a parafrontale at middle, considerably narrowed at extremities, frontal triangle almost reaching middle, parafrontalia with 6–8 inclinate setae on more than lower half and an almost single row of proclinate setulae on upper half. Antennae dull reddish-orange, the segments somewhat browned. Palpi as in *bengalensis*. *Thorax* as in *bengalensis*, but the vittae narrowly connected along suture. *Abdomen* entirely as in *bengalensis*, the pollinosity, both grey and brown, perhaps somewhat denser. *Wings* somewhat browned, especially in male, setulae on r_{4+5} extending to well beyond *r-m*; *m* rather strongly upcurved and sinuous in apical part, apex lying distinctly farther proximad than apex of r_{4+5} (Pl. 1, fig. 8), R_5 at widest part more than twice as wide as at apex. *Legs* coloured as in *bengalensis*, the setulose *v* hairs at base of hind femora much shorter, apart from the first, seldom exceeding half the length of the femoral diameter.

Length.—4·8–6·6 mm., of wings 5·0–6·0 mm.

Distribution.—CEYLON. INDIA (Madras ; U.P. (Uttar Pradesh); Orissa; Bengal). BURMA (Rangoon; Bassein). MALAYA (Upper Perak; Kuala Lumpur; Penang). CHINA. FORMOSA. PHILIPPINE IS.

The hair on the mesonotum is normally not longer than in *bengalensis*, but the specimen from Tengyueh which Zumpt has seen has longer hair. Two other males with longish hair

seen and labelled by Zumpt as *dubitalis* (originally labelled '*oblongopunctata*' by me) prove to be *calcitrans*.

69. **Stomoxys pulla** Austen.

(Fig. 40)

1909. ! *Stomoxys pulla* Aust., *Ann. Mag. n. H.* (8), **III**, 294. Types: Mussoorie. B.M.

Dark chocolate-brown with some brown dust, which is especially noticeable at neck, shoulders and sides. *Head* with silver-white and pale golden dust on face and pale golden and brown dust on parafrontalia; eyes in male separated by one-ninth head-width, frons somewhat narrowed from both extremities to middle, interfrontalia almost parallel-sided or slightly widened anteriorly, 4–5 times as wide at middle as a parafrontale, the latter linear at middle, very narrow in front and behind, with about 8 inclinate setae on anterior two-thirds and proclinate setulae continuing the row in single file on upper third. Antennae wholly fuscous, but third segment with dense grey pollinosity. Palpi yellowish-orange, longer than antennae, somewhat exceeding fore margin of mouth. *Thorax* with the four vittae distinct in front of suture, where they appear fuscous-brown on brown ground, but broadly suffused and indistinct behind suture. *Abdomen* similar to that of *indica*, but the dust much more uniformly brown, so that the greyish parts do hardly contrast, fourth segment more greyish-dusted with a pair of broad shifting darker vittae. *Wings* conspicuously browned, the setulae on r_{4+5} fine, exceeding *r-m*, apex of *m* conspicuously upcurved and sinuous, lying somewhat proximad of level of apex of r_{4+5}, R_5 at widest part two-and-a-half times as wide as at apex. Lower calyptra brown, subopaque. Halteres pale reddish-yellow. *Legs* fuscous with pale testaceous knees; *v* surface of hind femur at base with one long erect setulose hair, which is longer than the femoral diameter, and beyond it with a few shorter half-erect hairs; basal two segments of fore tarsus in male on *ad* surface with a row of outstanding setulose hairs; each of these is bent in an *a* direction at its base, so that their main part lies at right angles with the tarsal segment.

Length.—4·2–4·6 mm., of wings 4·3–4·5 mm.

Distribution.—INDIA (Mussoorie, U.P.). The species was captured in Sept. 1906 in two males by Mr. F. M. Howlett and has apparently never been found since.

Genus 10. **Haematostoma** Malloch.

1932. *Haematostoma* Mall., *Ann. Mag. n. H.* (10), **IX**, 379, 427; Zumpt, 1939, **VII**, *Intern. Kongr. Ent. Berlin*, 1938, 1731. Genotype: *austeni* Mall.

Head with large bare vertically-elongate eyes, the hind margin of which is broadly and rather deeply emarginate, jowls pushed to underside of head, hardly wider than palpi; frons of male narrow, of female wide, interfrontalia well developed, without cruciate setae, frontal triangle short, parafrontalia well defined; ocellars well developed, verticals indistinct in male, distinct in female (according to Malloch's figure); face deeply excavate, vibrissal angles markedly produced. Arista in addition to the rays on dorsal surface with 3–4 long rays on underside; proboscis more than half as long again as head, laterally compressed and hardly tapering to apex, which is much stouter than in *Stomoxys*; palpi filiform, half as long as head. *Thorax* with 0+1 *acr*, 0+1 *dc* (and a few almost hairlike ones), only the last *ia* (fine) and one *sa* (strong) present, *prst* rather fine, humerals, notopleurals, postalars well developed; propleural, prostigmal and anterior mesopleural distinct, 1+1 *stpl*; prosternum and pteropleura setulose, propleural depression and hypopleura bare. *Abdomen* short and broad, without setae, with sharply defined glossy black articulating areas. *Wings* evenly haired, without setulae, except on r_{4+5} to well beyond *r-m*; *m* broadly and strongly bent forward near middle of apical section, R_5 conspicuously wider at apex (Fig. 41) than at base. *Legs* slender, fore and mid tibiae presumably without submedian setae.

Distribution.—Only known from ORIENTAL REGION.

The only species, the biology of which is unknown, is strikingly similar to *Stomoxys pulla* Aust. The latter differs from it by much longer palpi, hairy propleura and hypopleura, only one *stpl*, etc., in addition to the absence of rays from the underside of the arista.

70. **Haematostoma austeni** Malloch.

(Fig. 41)

1932. ! *Haematostoma austeni* Mall., *Ann. Mag. n. H.* (10), **IX**, 427. Type: Samawang nr. Sandakan. B.M.

Fuscous-black with brown (♂) or brown-grey (♀) dust. *Head* coloured and dusted like the body; frons of male at middle one-eleventh head-width, somewhat widened to

extremities, frontal triangle confined to ocellar tubercle, interfrontalia narrowest at middle, where they are less than thrice width of a parafrontale; the latter almost linear, with about ten fine inclinate setae, the more dorsal ones becoming gradually proclinate; vertex of female almost two-fifths head-width, somewhat widened to lunula, ocellar triangle not much larger than ocellar tubercle, interfrontalia somewhat narrowed at extremities, at middle about thrice width of a parafrontale. *Thorax* with the two vittae on either side more or less fused and in female conspicuously darker than median and lateral parts of dorsum, in male indicated only anteriorly, the dorsum being largely dark brown with paler dust at sides and on median presutural part. *Abdomen* apparently without a distinct pattern. *Wings* conspicuously browned, veins dark brown; R_5 almost twice as wide at apex as at base, *m* broadly and moderately strongly upcurved, slightly sinuous. Basicosta brown. Calyptrae rather opaque, dark brown in male, greyish-brown in female. Halteres dull brownish-yellow (♀). *Legs* dark brown; hind femur without an *av* pre-apical; in male with a long *v* seta at base and a long *av* and *pv* at three-fifths at the same level, an *ad* row and two small *pd* pre-apicals, hind tibia with three long fine *v* setae from middle to beginning of last quarter.

Length.—*c.* 5 mm., of wings 4·8 mm.

Distribution.—BURMA: Insein. MALAYA: Singapore. N. BORNEO (type).

The female type is very broken (and according to a MS note by Miss Aubertin was so already before 1934), and the other two specimens are also very defective, so that neither Miss Aubertin nor I have seen fore and middle legs or the legs of the female.

Genus 11. **Haematobia** Lepeletier de St. Fargeau and Serville.

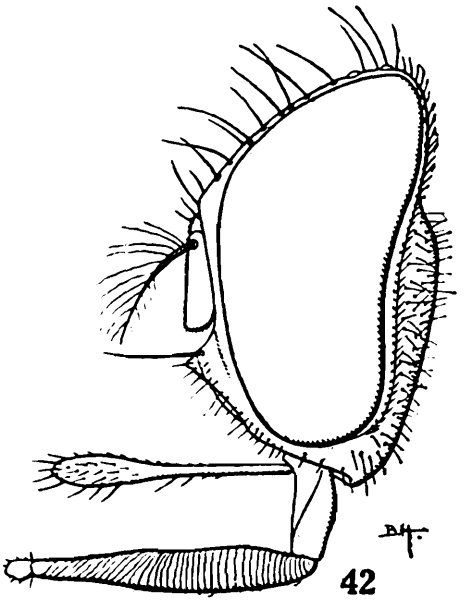
1828. *Haematobia* Lep. and Serv., *Enc. meth. Ins.*, **X**, 499. Genotype: *Stomoxys stimulans* Meig. (fixation by Bezzi, 1911, disregarding ambiguous fixation by Westwood, 1840, as '*irritans* L. Meigen t. 38, f. 8', the figure concerning *irritans* (L.) auct. nec L.=*stimulans* Meig.).

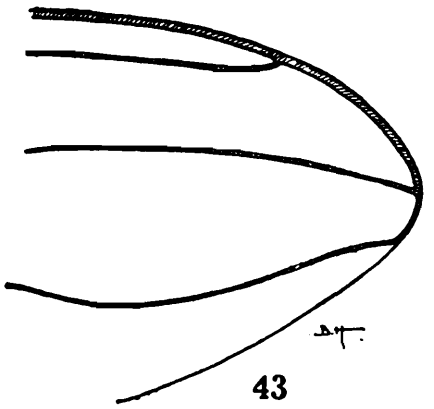
1909. sbg. *Bdellolarynx* Aust., *Ann. Mag. n. H.* (8), **III**, 290. Genotype: *sanguinolenta* Aust.

1912. *Lyperosiops* Tns., *Proc. ent. Soc. Wash.*, **XIV**, 47. Genotype: *stimulans* Meig.

1932. sbg. *Haematobina* Mall., *Ann. Mag. n. H.* (10), **IX**, 380, 442. Genotype: *latifrons* Mall.

Head with large bare, vertically-elongate eyes, the hind margin of which is broadly emarginate (Fig. 42), jowls pushed largely to underside of head, narrow; frons of male narrow, of female wide, interfrontalia well developed, without cruciate setae, frontal triangle short, parafrontalia well defined;





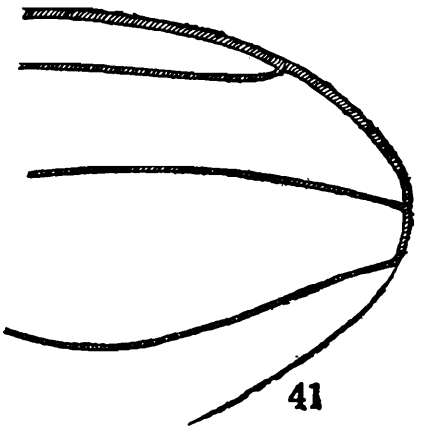


FIG. 41. *Haematostoma austeni* Mall., wing tip.
FIG. 42. *Haematobia sanguinolenta* Aust., head of male.
FIG. 43. *Haematobia sanguinolenta* Aust., wing tip.

ocellars and inner verticals distinct, though in male rather fine; face concave, vibrissal angles produced, mouth-margin distinctly produced between vibrissae though broadly truncate. Arista in addition to the rays on dorsal surface with some long rays on underside; proboscis (mentum+labella) up to more than half as long again as head, moderately tapering

to apex, which is stouter than in *Stomoxys*; palpi laterally compressed, clavate, longer than head, the inner surface longitudinally excavate, glabrous and shining. *Thorax* with 0+1 *acr*, the *dc*, except for the last 1–2, weak but as a rule partly distinct, only the last *ia* and one *sa* present, posthumeral fine, *prst* well developed, humerals, notopleurals, postalars well developed, normal ; propleural and prostigmal fine and often indistinct, anterior mesopleural well developed, 1+1 *stpl*; prosternum with black setulae (except in the Ethiopian species *latifrons* Mall. and *hirtifrons* Mall.*), pteropleura setulose, propleural depression and hypopleura bare. *Abdomen* short and broad, without setae, with sharply defined glossy black articulating areas. *Wings* with *m* broadly upcurved in its last section, R_5 being up to almost twice as wide at apex as at base; r_1 setulose above or bare, r_{4+5} with or without a few setulae at extreme base. *Legs* rather slender, fore tibia without submedian setae, mid tibia without *a* or *v* setae, hind tibia without *v* or *p* setae.

Distribution.—PALAEARCTIC, ORIENTAL and ETHIOPIAN REGIONS.

Biology.—Adults bite cattle, horses and, rarely, man during day-time in the open; at night they rest in grass, etc. Eggs are laid singly (*sanguinolenta*) or in small batches of about 12 (*sanguisugens*) on fresh cow- or horse-dung. In *sanguinolenta* they are brown and laid on the surface, in *sanguisugens* they are whitish and deposited in crevices or below the surface of the excrements. Metamorphosis is completed in 11–14 days at a room temperature of 23–24° C. and in 14–18 days at 20–21° C. Life history and early stages were described by Mitter (1916, *Ind. J med. Res.*, **III**, 530–540); Muirhead Thomson (1937, *Parasitol.*, **XXIX**, 282–288) and Thomsen (1938, *Stuefluen og Stikfluen*, 295–304) dealt with the European *H. stimulans* Meig.

Malloch (1932) divided the genus into three subgenera, but the type of *angustifrons* Mall., whilst otherwise tallying with *hirtifrons* and *latifrons*, has the prosternum setulose. It thus appears that sbg. *Haematobina* Mall. is separated from *Bdellolarynx* only by the shape of the palpi and the different frontal rows of the male. *Lyperosiops* Tns. is an absolute synonym of *Haematobia* s. str., if *stimulans* is accepted as the genotype of the latter.

---

* The prosternum is also setulose in *H. angustifrons* Mall., although Malloch includes the latter in *Haematobina*.

Key to the Species of Haematobia

1 (2) Tibiae fuscous except for the pale knees, mid tibia with a small submedian *p* seta, hind tibia with a small submedian *ad* seta. Hair of thorax longer, in male at least as long in front of suture as width of third antennal segment (sbg. *Haematobia* s. str.). ... *sanguisugens* Aust., p. 171

2 (1) Tibiae pale testaceous, without submedian setae. Hairs in front of suture of thorax somewhat shorter than width of third antennal segment, even in male (sbg. *Bdellolarynx* Aust. . *sanguinolenta* Aust., p. 172

Sbg. **Haematobia** s. str.

Characterized by the presence of a small *p* seta on the mid tibia and a small *ad* on the hind tibia. r_1 often with some black setulae on dorsal surface; r_{4+5} normally distinctly setulose at base.

Distribution.—PALAEARCTIC and NEARCTIC REGIONS. In INDIA only in the Himalayas.

71. **Haematobia** (s. str.) **sanguisugens** Austen.

1909. ! *Haematobia sanguisugens* Aust., *Ann. Mag. n. H.* (8), **III**, 288. Types: Kasauli. B.M.

1910. *Haematobia rufipes* Brun., *Rec. Ind. Mus.*, **IV**, 65. Types: Darjeeling; Nepal. Indian Mus., Calcutta.

Fuscous with brown-grey dust. *Head* with silver-grey dusted face and pale golden-dusted parafacialia and parafrontalia; eyes of male subcontiguous, separated by less than width of antenna, interfrontalia dull black, at middle linear or almost so, parafrontalia linear, except in front, with about ten pairs of inclinate setae, which reach level of posterior ocelli, the most dorsal ones somewhat proclinate; frons of female (according to Brunetti) about one-third head-width, parafrontalia with 9 setae, the upper four in a somewhat irregular row. Palpi orange, conspicuously clavate and projecting much beyond mouth-margin. Proboscis piceous-brown. *Thorax* with the usual four fuscous vittae, which are more or less edged with brown dust, the *prst* part of the outer one diverging forward; a median vitta on posterior part, which may extend to *prst* part, somewhat less conspicuous; scutellum with a broadly transverse dark basal spot. Only the last two *post dc* conspicuous, the last *prst dc* fine but

quite distinct. *Abdomen* with a narrow complete or almost complete dark median vitta and, on each of the anterior three segments, a pair of subtriangular to transverse-ovate fuscous spots, which are largest on the second segment and somewhat indeterminate. *Wings* slightly brownish with brown veins and evenly haired membrane; r_1 sometimes with 1–2 setulae on dorsal surface, more often bare; r_{4+5} (almost ?) always with one or a few small setulae at base; R_5 nearly twice as wide at apex as at base; basicosta testaceous. Calyptrae pale brownish-grey, subopaque. Halteres pale yellow. *Legs* fuscous, knees reddish, base of tibiae testaceous; mid tibia with a small submedian *p* seta; hind tibia with a small *ad.*

Length.—*c.* 5–5·8 mm., of wings 4·7–5·6 mm.

Distribution.—N. INDIA (Punjab (Himachal Pradesh); Simla; Kasauli; Darjeeling). NEPAL: Noalpur.

Sbg. **Bdellolarynx** Austen.

Posterior tibiae without submedian setae. r_1 without setulae; r_{4+5} seldom with 1–2 minute setulae at base.

Distribution.—ORIENTAL and ETHIOPIAN REGIONS.

72. **Haematobia (Bdellolarynx) sanguinolenta** Austen.

(Figs. 42, 43)

1909. !*Bdellolarynx sanguinolentus* Aust., *Ann. Mag. n. H.* (8), **III**, 290. Types: Calcutta. B.M.

1918. *Haematobia nudinervis* Stein, *Ann. Mus. nat. Hungar.*, **XVI**, 150. Types: Kosempo; Polisha; Kankau. Mus. Budapest.

1918. *Haematobia rufipes* Stein, *ibid.*, 151 (nec Brun.). Types: Polisha. Mus. Budapest.

Fuscous with grey or brownish-grey dust. *Head* with more silver or pale golden (some males) dust; frons in male $\frac{1}{7}$–$\frac{1}{9}$ head-width at narrowest part, slightly above middle, somewhat widened to extremities, interfrontalia half as wide again at middle as a parafrontale, hardly widened to vertex, slightly widened to lunula, parafrontalia narrow, of almost even width, setae approaching level of posterior ocelli, in one row, which may be slightly irregular behind; in female frons at vertex a third (0·33–0·38) head-width or wider, at lunula well over two-fifths (0·42–0·45) head-width,

interfrontalia gradually somewhat narrowed to vertex, slightly narrowed at lunula, at widest part about thrice width of a parafrontale, the latter somewhat widened at lunula, otherwise of almost even width, but very slightly narrower in front of middle, setae on upper two-fifths rather few, but in three irregular rows, among them two distinct proclinate setae. Antennal segments infuscate with orange edges; palpi pale orange-yellow, slender at base, apical two-fifths conspicuously clubbed. Proboscis brownish-orange, the apical part chestnut-brown. *Thorax* densely dusted with the inner vittae almost linear and separated by a third width of thorax, outer vittae separated from inner ones by the width of the latter, twice as wide, but rather broadly interrupted at suture, their presutural part conspicuously diverging forward. *Abdomen* subcircular, densely dusted grey, each segment on posterior part with a suffused dark brown median vitta and a similarly dusted broadly transverse spot or, in their place, brown shadows, fourth segment with erect, the others with decumbent hairs. *Wings* wholly haired, slightly brownish, with light brown veins; *m* not markedly sinuous at apex, only moderately upcurved, R_5 less than twice as wide at apex as at base, and its greatest width not or hardly greater than its apical width. Calyptrae subopaque, in female grey, in male brown-grey. Halteres pale brownish-yellow. *Legs* piceous-brown, with the tibiae and the tip of the femora (on the anterior ones the apical sixth) pale testaceous, tarsi infuscate, in female the apical part of the tibiae slightly browned; all tibiae without submedian setae.

Length.—3·7–5·8 mm., of wings 4·3–5·8 mm.

Distribution.—CEYLON. INDIA (Madras; Bombay; U.P. (Uttar Pradesh); Bihar; Bengal; Assam). FORMOSA. CHINA (Peiping).

Biology.—Adults were found hovering in slaughter-house.

Genus 12. **Lyperosia** Rondani.

1803. *Siphona* Meig., of authors (nec Meigen, *Illigers Mag.*, **II**, 281, Meigen's description referring to the Tachinid *S. geniculata* DeG., misidentified as *Stomoxys irritans* Fabr.).

1856. *Lyperosia* Rond., *Dipt. ital. Prodr.*, **I**, 93; 1862, *ibid.*, **V**, 230. Genotype: *Conops irritans* L.

1906. sbg. *Glossinella* Grünb., *Zool. Anz.*, **XXX**, 85. Genotype: *schillingsi* Grünb.

1924. *Haphospatha* End., *Konowia*, **III**, 51; 1928, *Z. angew. Ent.*, **XIV**, 358. Genotype: (*hirudo* End.=) *thirouxi* Roub.

1932. *Haematobia* Lep. and Serv. of Mall., *Ann. Mag. n. H.* (10), IX, 379, 501 (nec Lep. and Serv., 1828).

Head with large bare vertically-elongate eyes, the hind margin of which is only very slightly emarginate and only in lower half, jowls very narrow, largely pushed to underside of head; frons of male narrow, of female rather narrow, interfrontalia well developed though more or less narrow, without cruciate interfrontal setae, frontal triangle short, parafrontalia well developed, at least as wide as narrowest part of interfrontalia, frontal setae, ocellars, inner and outer verticals all subequal, rather strong but often short; face concave, short, vibrissal angles slightly produced, less projecting than frons, mouth-margin broadly truncate, not produced between vibrissae. Arista with rays on dorsal side only; these decrease in length from near base to apex; proboscis (mentum+labella) at least half as long again as head, slender and rather strongly tapering; palpi laterally compressed, longer than head, slightly or conspicuously clavate, inner surface longitudinally excavate, glabrous and shining. *Thorax* with 0+1–2 *acr*, at least the last two *dc* distinct, *ph*, humerals, *prst*, two *npl*, *sa*, 1–2 *ia*, 2 postalars well developed, propleural not very conspicuous, prostigmal indistinct among the adjacent setulose hairs, 1+1 *stpl*, prosternum bare or with yellow setulae, propleural depression and hypopleura bare, pteropleura setulose. *Abdomen* ovate, longer than wide, articulating areas concolorous, matt and dusted, with fine but rather conspicuous marginal setae, especially on posterior segments. *Wings* with *m* broadly and moderately upcurved in its last section, widest part of R_5 seldom exceeding twice the apical width; r_1 and r_{4+5} bare like the other veins. *Legs* rather slender, tibiae without submedian setae, except sometimes for an *av* or a very small *p* seta on the mid tibia.

Distribution.—PALAEARCTIC, ORIENTAL and ETHIOPIAN REGIONS, introduced into the AUSTRALIAN and NEARCTIC REGIONS and into CENTRAL AMERICA and the W INDIES.

Biology.—The adults bite buffaloes, cattle, zebu, horse and, very occasionally, dog and man. Oxen are preferred to cows and old or weakened hosts to young and strong ones (Handschin, 1933). As the fly often occurs in enormous numbers, it causes great damage to the health of cattle. Like *L. irritans* L., which was studied by Thomsen (1938, *Stuefluen og Stikfluen*, 287–295), *L. exigua* leaves the host seldom of its own accord, except for laying eggs. The latter are deposited on or below freshly fallen droppings, especially

of buffalo and cattle, the dung forming the food of the larvae; pupation in the droppings or in the soil just below. Transformation from egg to adult at 23° C. in 19·5 days and at 35° C. in 10·4 days, from which figures the development would be calculated to require at 15° C. almost 47 days and at 20° C. 25 days, whilst in the Palaearctic *L. irritans* L. Thomsen found the development time to vary from 7¾ days at 34·9° C. to almost 25 days at 18·6° C. The values for *L. exigua* are, however, not very well secured (Davidson, 1937).

Sbg. **Lyperosia** Rondani s. str.

Sixth vein gradually tapering and extending more than half-way to hind border of wing. ♂: Hind tarsi obliquely flattened and with long fine erect curled hairs.

Distribution.—NEARCTIC, PALAEARCTIC (*irritans*), ORIENTAL, AUSTRALIAN (*exigua*) and ETHIOPIAN (*spiniger* Mall.) REGIONS, everywhere represented by a single species, which species seem to be mutually exclusive and should therefore perhaps rather be considered as subspecies.

Key to the Species of Lyperosia

1 (2) Sixth vein becoming gradually thinner (Pl. 1, fig. 9) and terminating rather more than half-way to border of wing (sbg. *Lyperosia* s. str.). Prosternum richly setulose. Anterior mesopleural and submedian *av* seta of mid tibia absent. ♂: Segments (especially intermediate ones) of hind tarsi flattened and on the *p* surface with fine erect setulose hairs with curled apices (Fig. 44); without proclinate orbital setae. . . . . . *exigua* Meij., p. 176

2 (1) Sixth vein very short (Pl. 1, fig. 10), ending abruptly at ¼–⅖ of distance from its base to margin (sbg. *Glossinella* Grünb.). Prosternum without or with only 2-3 pairs of setulose hairs. ♂: Hind tarsi simple.

3 (4) Anterior mesopleural and submedian *av* seta of mid tibia absent. Prosternum with 2–3 pairs of setulose hairs. Palpi slightly clubbed, fully three-quarters length of height of head. ♂: With 2–3 proclinate orbital setae like female. *minuta* Bezzi, p. 178

4 (3) Anterior mesopleural and submedian *av* seta of mid tibia distinct though small. Prosternum bare. Palpi conspicuously clubbed about two-thirds length of height of head. ♂: Without proclinate orbital setae. *titillans* Bezzi, p. 179

73. **Lyperosia** (s. str.) **exigua** de Meijere.

(Fig. 44, Pl. 1, fig. 9)

1903. *Haematobia exigua* Meij., in Schat, *Meded. Proefst. Oost-Java* (3), No. 44, 17; 1904, *Bijdr. Dierk.*, **XVIII**, 104; Mall., 1932, *Ann. Mag. n. H.* (10), **IX**, 504–506; Handschin, 1933, *Rev. suisse Zool.*, **XL**, 449 (biology); Davidson, 1937, *Austral. J. exp. Biol. med. Sci.*, **XV**, 113–120 (biology). Type: Java. Mus. Amsterdam.

1910. *Lyperosia flavohirta* Brun., *Rec. Ind. Mus.*, **IV**, 89. Types: Kawkareik, L. Burma. Indian Mus., Calcutta.

1932. ! *Haematobia australis* Mall., *Ann. Mag. n. H.* (10), **IX**, 504, 506. Types: Darwin, N. Australia. B.M.

Fuscous-brown with whitish-grey dust. *Head* densely dusted silver-grey with the upper part of occiput fuscous; eyes in male separated by one-sixth to one-eighth head-width, interfrontalia brown to fuscous, distinct though narrower than a parafrontale above middle, moderately dilated anteriorly, very slightly posteriorly, parafrontalia very narrow and of equal width, except at anterior extremity, with 8–9 inclinate setae, which reach level of anterior ocellus, the most dorsal setae somewhat proclinate; vertex of female about three-tenths head-width, interfrontalia slightly dilated to lunula, upper half more or less conspicuously narrower than parafrontalia, the latter on anterior three-fifths with 5–6 inclinate and on posterior half with three proclinate setae. Palpi pale testaceous, exceeding mouth-margin by more than half length of head; proboscis testaceous to piceous, about as long as height of head. Antennae orange, with the second and third segments extensively browned. *Thorax* with the paramedian vittae indicated only towards neck, the outer vittae broad and conspicuous though somewhat suffused and interrupted at suture. The last *prst dc* and the posterior two *post dc* usually conspicuous as is the *prsc*, the other setae of the disc of the mesonotum more or less weak or indistinct, the setae of the dorsolateral area well developed. Prosternum with long yellow bristles along margins; anterior mesopleural seta absent; setae and hair pale yellow to brown. *Abdomen* densely and uniformly dusted greyish-brown with a narrow undusted fuscous-brown median vitta on anterior

three segments. *Wings* subhyaline, wholly haired, slightly brownish-grey, veins brown to light brown; vein r_{4+5} almost as much downcurved as *m* upcurved at apex, R_5 more than twice as wide at widest part as at apex, *m* not distinctly sinuous at apex; sixth vein gradually tapering, extending more than halfway to margin from distal end of anal cell. Lower calyptra subopaque, greyish-white with pale yellowish fringe, the border sometimes brownish. Halteres pale yellow. *Legs* pale testaceous, the apical tarsal

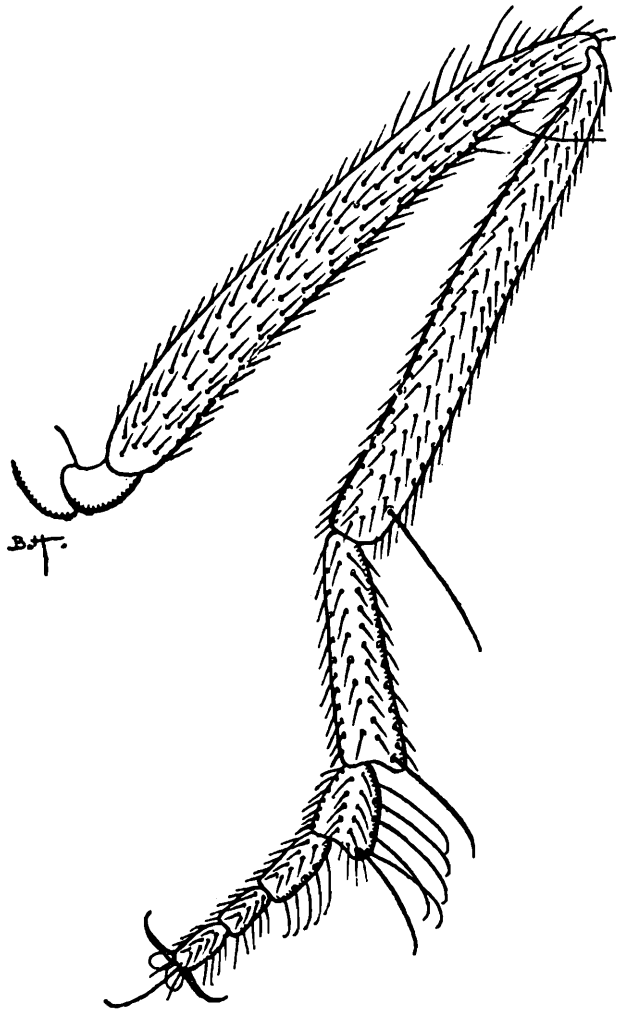


FIG. 44. *Lyperosia exigua* de Meij., hind leg of male.

segments usually somewhat browned, the femora and to a lesser extent tibiae sometimes browned; mid tibiae without an *av* but often with a very small *p* seta; hind tarsi of male obliquely flattened and broadened to apex of each segment, so that the *pd* surface of the tarsi, especially the second and third segments, forms a broadly saw-toothed crest, which bears long setulose hairs with curled tips.

Length.—2·8–4·2 mm., of wings 3·3–3·8 mm.

Distribution.—CEYLON. INDIA. BURMA. MALAYA. INDONESIA to AUSTRALIA. ADMIRALTY and SOLOMON IS. SIAM. S. CHINA. FORMOSA. PHILIPPINE IS.

The colouration of the bristles and legs is variable and apparently influenced by the climate, but the HOLARCTIC *L. irritans* can probably always be distinguished by its much longer hair and setae, the *acr* hairs of the male being fully as long as the third antennal segment, whilst in *exigua* they are (with the exception of 1–2 in the outer row) much shorter than that segment.

Sbg. **Glossinella** Grünb.

Differing from *Lyperosia* s. str. by the shortened, stumpy sixth vein, which extends over at most two-fifths the distance from end of anal cell to wing margin, and by simple male hind tarsi.

Distribution.—Several species in the ETHIOPIAN REGION, two of them also in parts of the ORIENTAL REGION and one in the PALAEARCTIC.

74. **Lyperosia (Glossinella) minuta** Bezzi.

(Pl. 1, fig. 10)

1892. *Lyperosia minuta* Bezzi, *Ann. Mus. civ. Genova*, **XXXII**, 192. Types: Obbia (Somaliland). Mus. Genova.
1906. *Lyperosia longipalpis* Roub., *C.R. Soc. Biol. Paris*, **LX**, 896. Types: Senegal. Mus. Paris.
1928. *Glossinella potrix* End., *Zschr. angew. Ent.*, **XIV**, 362. Types: Socotra. Mus. Berlin.

Fuscous-brown with pale grey dust. *Head* rather densely dusted grey, upper part of occiput fuscous; eyes in male separated by $\frac{1}{9}$–$\frac{1}{12}$ head-width, interfrontalia black, parafrontalia with 3–5 inclinate setae on anterior half and with three somewhat stronger proclinate setae on posterior half, otherwise as in *exigua*; in female just over a quarter head-width at vertex, over a third to almost two-fifths head-width at lunula, interfrontalia fully as wide above as a parafrontale, somewhat dilated anteriorly, parafrontalia of almost even width, on anterior three-fifths with 3–5 inclinate and on posterior three-fifths with 3 proclinate setae. Palpi fuscous-brown, exceeding mouth-margin by almost length of head, slender and only slightly clubbed, narrower than fore tibia; proboscis piceous-brown with light brown apical part, conspicuously longer than height of head. Antennae orange, third segment infuscate with orange base. *Thorax*

with a pair of broad fuscous vittae, which are as wide as the pale dusted vitta between them, the paramedian vittae more or less traceable as a narrow brown-grey dusted stripe on inner margin of the dark vittae; the vittae even more extended laterally behind suture where a narrow dark median vitta is usually also visible; *dc* rather short, except for the last two; *prsc* and the dorsolateral setae well developed. Prosternum with 1–3 fine yellow setulose hairs on each side; anterior mesopleural absent. *Abdomen* rather densely dusted brown-grey, in male with a moderately broad undusted median vitta on anterior three segments; in female the disc largely dark brown, and the median vitta only defined by brown dust on posterior part of third segment (in dorsal or anterodorsal view). *Wings* as in *exigua* but with much shorter and more suddenly terminating sixth vein. Lower calyptra subopaque brownish-white with whitish fringe, sometimes narrowly brownish suffused towards border. Halteres pale reddish-yellow. *Legs* pale testaceous, femora often more or less browned; tibiae without any submedian setae; except sometimes for a minute *p* seta on the mid tibia; tarsi of male simple.

Length.—2·2–3·5 mm., of wings 2·0–3·3 mm.

Distribution.—W to E. AFRICA (Sudan to Nyasaland). ARABIA. CEYLON. S. INDIA. N. INDIA (to Bengal).

75. Lyperosia (Glossinella) titillans Bezzi.

1900. *Lyperosia tibialis* R.-D., of Hough, *Term. Füzet.*, **XXXIII**, 250; Strobl., 1909, *Verh. zool.-bot. Ges. Wien.*, **LIX**, 235 (nec Robineau-Desvoidy).

1907. *Lyperosia titillans* Bezzi, *Rend. Inst. Lomb. Sci. Lett.* (2), **XL**, 454 (nom. nov. pro *Lyperosia irritans* L. of Rondani, 1862, *Dipt. ital. Prodr.*, V, 231) (nec L.).

1929. *Haphospatha equina* End., *Zschr. angew. Ent.*, **XIV**, 364. Types: E. Germany, Hungary. Mus. Berlin.

1937. *Haphospatha bovina* Peus, *Zschr. angew. Ent.*, **XXIV**, 152. Types: Riga. Mus. Berlin.

1937. *Haphospatha scolopax* Peus, *Zschr. angew. Ent.*, **XXIV**, 152. Type: Bázias (Hungary). Mus. Berlin.

Fuscous-brown with brown-grey dust. *Head* with brownish-grey to grey dust and fuscous upper part of occiput; eyes in male separated by $\frac{1}{9}$–$\frac{1}{12}$ head-width, interfrontalia fuscous-black, parafrontalia with 6–8 in- and 2–3 pro-clinate setae, the upper ones not stronger and pointing in the same direction as the lower ones; frons otherwise as in *exigua*, in female three-tenths head-width at narrowest part, which

lies at vertex or somewhat in front of it, almost or fully two-fifths head-width at lunula, interfrontalia somewhat narrower behind middle than a parafrontale, very slightly dilated behind, distinctly dilated anteriorly where it may be as wide as or even a little wider than a parafrontale; the latter with 6–8 inclinate setae, which often reach, or closely approach, level of anterior ocellars, and above with 2–3 proclinate setae. Palpi markedly clubbed and browned, projecting beyond mouth-margin by two-thirds length of head, proboscis light chestnut-brown, as long as height of head. Antennae brownish-orange, third segment infuscate with orange base. *Thorax* with rather suffused (especially in female) dark vittae, the paramedian ones usually distinct anteriorly, but fading out towards suture, the outer ones broad, in male brown-dusted, in female brownish-grey-dusted and therefore not very conspicuous; *dc* small, except for the last one or two, and often two *prst* ones, *prsc* and the dorsolateral setae well developed. Prosternum bare; anterior mesopleural well developed. *Abdomen* rather densely and uniformly dusted brownish-grey, in male with an inconspicuous rather broad and suffused darker brown median vitta on anterior three segments. *Wings* as in *exigua*, but R_5 less narrowed, at least half as wide at apex as at widest part; sixth vein at most extending two-fifths the distance from end of anal cell to margin, terminating abruptly. Lower calyptra greyish-white, subopaque, with whitish fringe, the border brownish-white. Halteres pale reddish-yellow. *Legs* with more or less infuscate femora, often wholly infuscate; fore and hind tibiae without submedian setae, mid tibia with a small *av* (and usually a very small *p*) seta beyond middle; tarsi of male simple.

Length.—2·3–3·5 mm., of wings 2·5–3·0 mm.

Distribution.—From E. GERMANY and ITALY to KASHMIR (Gandarbal; Baniar; Kobarnag).

Biology.—Biting horses and cattle.

Subfamily *PHAONIINAE.*

Upper embossed part of pteropleura bare or setulose, if setulose three *stpl* present and arranged in a very pronounced triangle which has a distinct right or moderately obtuse angle at the lower *stpl* (Fig. 45). Lower calyptra as a rule strongly rounded at apex and narrowed from base onwards, *i.e.* its inner margin diverging from margin of scutellum from base onwards, less often of *Musca* type, *i.e.* broad and following margin of scutellum for some distance and with

more or less truncate apex, in these cases the pteropleura quite bare. Sixth vein not reaching wing margin; *sc* always with a distinct though sometimes slight forward bend at a point more than half-way between *h* and *c* (Pl. 2, figs. 11–14, 19). Proboscis normal, not strongly tapering to apex, with labella and, sometimes, prestomal teeth. Lower prostigmal seta upcurved or indistinct; if three *stpl* are present, the lower one seldom at the apex of an isosceles triangle, in these cases either the frons very narrow or two reclinate frontal setae present of which the *anterior* one is the weaker. Hind tibia (in addition to any *av, ad, pv*, etc., setae) often with one or several *pd* setae, but never with a strictly *d* seta basad of the *d* pre-apical. ♀ : with only five pairs of abdominal spiracles.

Distribution.—World-wide. In the ORIENTAL REGION the *PHAONIINAE* are by far the largest subfamily of the MUSCIDAE.

Biology.—The larvae of most genera live in dung and other decaying organic matter, but at least the third instar is probably always predaceous at least in part, attacking especially maggots of other Diptera. However, *Azelia* has been found to be able apparently to complete its transformation on a pure dung diet (Hammer, 1941, *Vidensk. Medd. Dansk nathist. For.*, CV, 85). *Synthesiomyia* feeds especially on carrion and probably does not require living prey in addition. Most LIMNOPHORINI develop submerged in decaying matter, keeping their pointed hind end in contact with the surface for breathing. *Phaonina* has been bred in some numbers from male inflorescences of the palm *Nipa fruticans* and has been recorded as damaging them extensively, and *Mydaea* (*Eumyiospila*) *pellucida* Stein has been found in similar conditions. In view of the habits of other members of the subfamily some suspicion must be felt that both species may have preyed to some extent on other larvae attacking these inflorescences. The larva of *Passeromyia* is found in birds' nests and is an intermittent parasite of the nestlings.

Egg.—By and large the eggs of the *PHAONIINAE* are of the flanged type as set out on p. 12, but the flanges may be restricted to the front end or may be very slight, and they are absent or practically absent in *Hydrotaea* (Fig. 8*i*, p. 12) and *Ophyra* (Fig. 8*f*, p. 12). The egg of *Hydrotaea* can probably be distinguished from those of the *MUSCINAE*, *STOMOXYDINAE* and *ANTHOMYIINAE* by the evenly converging ribs, which meet before reaching the hind end, and that of *Ophyra* by the close approximation of the ribs in their *entire* length.

Larva (third instar).—As the adults of some genera, especially of PHAONIINI, are markedly transitional towards the *MUSCINAE*, so their larvae show the same tendency. All Oriental *PHAONIINAE*, as far as is known, except *Passeromyia* (Fig. 10*f*), have what has been termed the carnivorous type of mouth-parts, *i.e.* well-developed accessory sclerites below the mouth-hooks and dental sclerites fused into a ventral arch (Figs. 10*g–k*). In most genera the posterior spiracles show three straight or almost straight slits, which radiate from the centre of the spiracular plate or are more or less parallel, but which are never arranged end to end as in

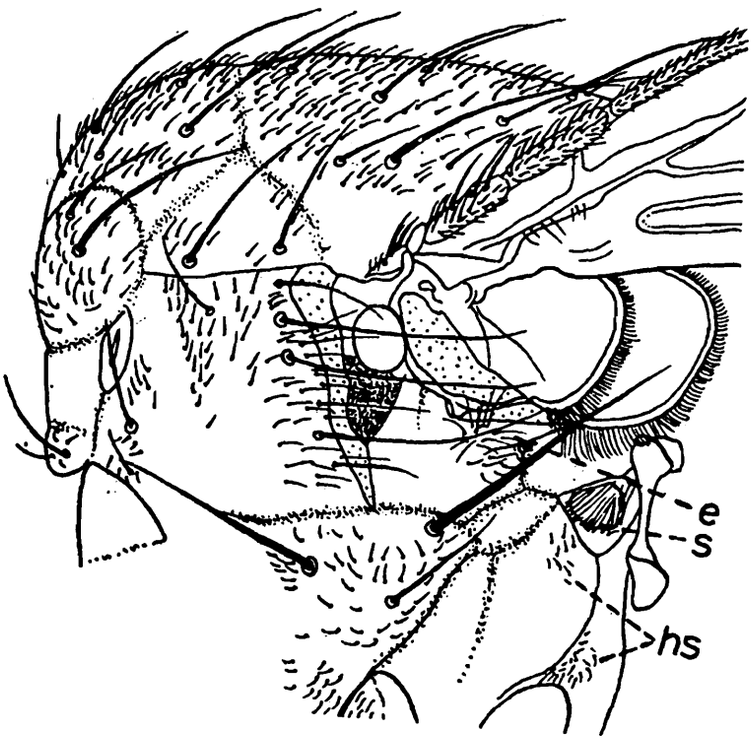


FIG. 45. *Dichaetomyia malayana* Mall., side view of thorax. *e*, embossed upper part of pteropleura; *s*, black setulae of metathoracic spiracle; *hs*, setulae of hypopleura.

MUSCINAE, *STOMOXYDINAE* and *Atherigona*. However, in the transitional genera *Passeromyia* (Fig. 11*l*, p. 18), *Synthesiomyia* and *Phaonina* (Fig. 11*m*) and *Xenosia* (Fig. 11*k*) they are strongly curved, deeply S-shaped or somewhat meandering respectively. In most LIMNOPHORINI (but not *Anaclysta*) the eighth abdominal segment is pointed, *i.e.* subtriangular in lateral view, the spiracle lying at the tip. It is impossible at the present stage of our knowledge to produce a larval key to the tribes and genera of the subfamily, but the above remarks in connection with the figures should allow the more distinctive groups to be recognized.

Key to the Tribes of PHAONIINAE

1 (2) Metathoracic spiracle with some black setulose hairs (inserted along lower margin) at least over posterior half, in addition to the feather-like operculum (Fig. 45). Pteropleura *or* the embossed upper anterior part of hypopleura conspicuously setulose; prosternum usually setulose. Lower calyptra always of *Phaonia*-type. Arista long-plumose. Mid femur with an *a* pre-apical. Hind tibia with a well-developed *ad* pre-apical in addition to the normal *d* one. *pra* almost always distinct. ... **2. DICHAETOMYIINI, p. 332**

2 (1) Metathoracic spiracle almost always without black setulose hairs in addition to the feather-like operculum; if these are present both the pteropleura and the embossed upper anterior part of hypopleura bare. Always either prosternum or pteropleura bare (in Oriental species).

3 (4) Hind tibia with a strong (in *Passeromyia* *, *Pictia* † and *Rhynchomydaea* ‡, fine) *pd* seta between middle of length and the *d* pre-apical (Fig. 46). If this seta is absent (some *Hydrotaea* and related forms), the *sc* not sinuated at all between its part farthest from *c* and its bend towards *c* (Pl. 2, fig. 19) and 4 *post dc* present or *p* surface of hind coxa with one or more setulae at apical margin. If the *pd* of the hind tibia is absent and 4 *post dc* present the male with one or several conspicuous *v* teeth, spines, or a group of spiniform setae near apex of front femur, and the female with a pair of both proclinate orbital and cruciate interfrontal setae (Fig. 1).. **1. PHAONIINI, p. 185**

4 (3) Hind tibia without a *pd* between middle of its length and the *d* pre-apical, but sometimes with a *pd* between base and middle (Fig.

---

* With *Musca*-like lower calyptra *and* cruciate interfrontals.

† With black setulose hairs on metathoracic spiracle.

‡ With a nose-like tubercle between antennae and with setulose pteropleura.

47). *sc* almost always sinuate between its part farthest from *c* and its bend towards *c* (Pl. 2, figs. 11, 13, 14); posterior surface of hind coxa without setulae. Pteropleura bare. ♂ without *v* teeth or spines (but sometimes with an *av* row of spiniform setae) near apex of front femur. ♀ not with both proclinate orbital and cruciate interfrontal setae.

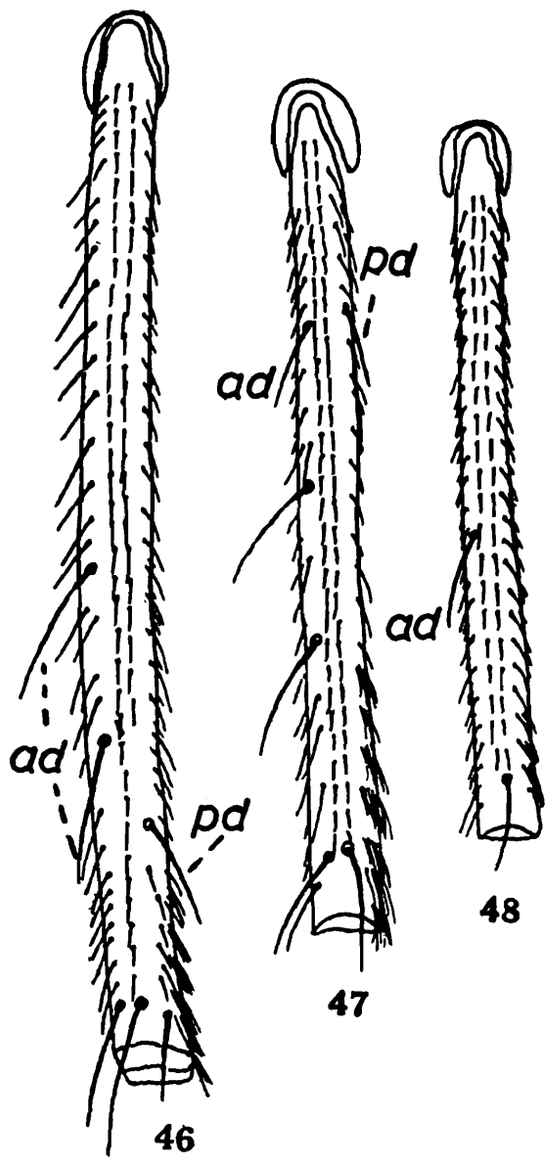


FIG. 46. *Phaonia longipalpis* sp. n., left hind tibia, dorsal view. *pd, pd* seta typical of PHAONIINI; *ad, ad* setae.

FIG. 47. *Helina appendiculata* (Stein), left hind tibia.

FIG. 48. *Gymnodia parascendens* (Hennig), left hind tibia.

5 (6) Hind tibia with a well-developed *ad* pre-apical (Fig. 47), seldom

without, but then longest rays of arista longer than diameter of third antennal segment *and* mid femur, as in almost all other species of this group, with an *a* pre-apical (Fig. 49). ... . . 3. MYDAEINI, p. 427

6 (5) Hind tibia without an *ad* (in addition to the normal *d*) pre-apical seta (Fig. 48) or at most with a small *ad* pre-apical which is not longer than the tibial diameter (whilst the normal *d* pre-apical has about twice this length), in this case longest rays of arista shorter than width of third antennal segment. Mid femur without an *a* pre-apical (Fig. 50) 4. LIMNOPHORINI, p. 541

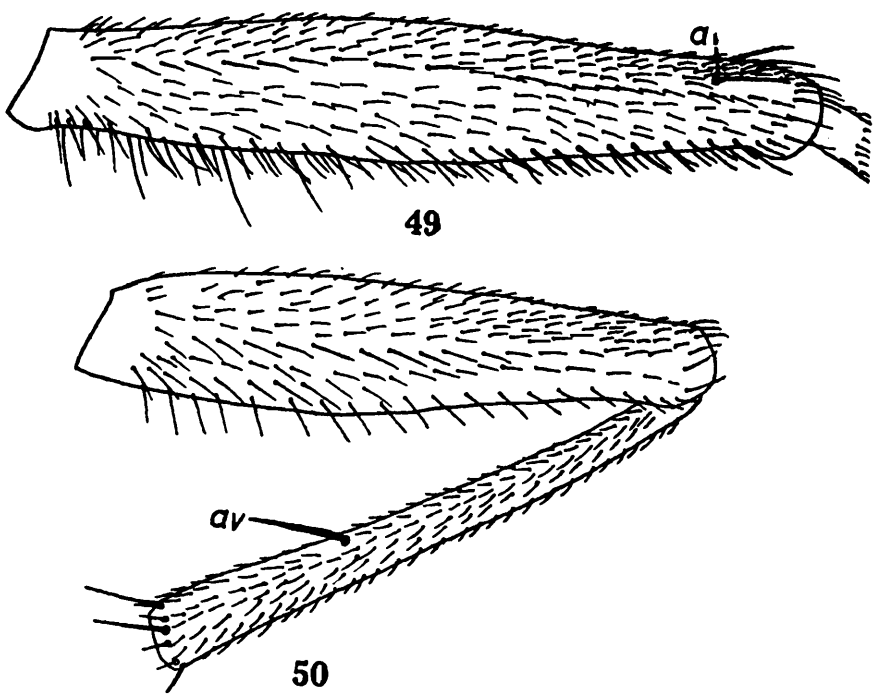


FIG. 49. *Mydaea* (*Euspilaria*) *argentata* (Walk.), left mid femur, anterior view. *a*, *a* pre-apical.

FIG. 50. *Anaclysta flexa* (Wied.), left mid leg, anterior view. *av*, *av* seta of tibia.

Tribe PHAONIINI

This tribe, from the ancestors of which the *FANNIINAE* and *ANTHOMYIINAE* are probably derived, is well represented in the ORIENTAL REGION. Whilst *Azelia*, *Hydrotaea* and *Ophyra* clearly connect the other genera with the *FANNIINAE*, and whilst *Pogonomyia* appears to lead over to the *ANTHOMYIINAE*, *Polietes* on the one hand and *Synthesiomyia*, *Phaonina* and related genera on the other link the

present tribe to the *MUSCINAE*. From LIMNOPHORINI and MYDAEINI the PHAONIINI are separated by the *pd* seta beyond the middle of the hind tibia. This seta is well developed in some *Hydrotaea* and *Ophyra* but weak or absent in other species of the same genera. The present tribe differs from the DICHAETOMYIINI by the pteropleura which is never setulose if the prosternum is hairy and by the absence of black setulae from the lower margin of the metathoracic spiracle (these are only present in a somewhat different arrangement in *Pictia* and *Buccophaonia*).

Key to the Genera of PHAONIINI

1 (12) Inner margin of lower calyptra closely adjacent to margin of scutellum, converging posteriorly with longitudinal axis of body, and suddenly turning outward into the apical margin, which is broadly truncate (Fig. 4): Upper anterior embossed part of hypopleura bare (Fig. 51). 1+2 strong *stpl.*

2 (5) Hypopleura conspicuously setulose just below the large spiracle (Fig. 51). R_5 not much wider at tip than at *r-m*. Supraspiracular convexity with rather long fine brown erect hair. Palpi orange.

3 (4) Arista appearing bare, the hairs being shorter than its basal diameter. Prosternum retulose. All veins (except costa) bare. Apex of abdomen orange. Cruciate interfrontals absent in both sexes. *prst acr* weak. ♂: Eyes separated by hardly a fifth head-width..... *Synthesiomyia* B. and B., p. 191

4 (3) Arista long-plumose. Prosternum bare. Base of r_{4+5} with a few setulae on ventral surface. Ground-colour of abdomen wholly black. Cruciate interfrontals present in both sexes. 2–3 conspicuous *prst acr*. ♂: Eyes separated by three-tenths head-width... .. *Passeromyia* R. and V., p. 194

5 (2) Hypopleura bare just below spiracle but sometimes setulose near hind coxa. Prosternum bare. Arista plumose (*Phaonidia* gen. n. ?).

6 (7) *m* strongly upcurved, its tip lying in front of wing tip and separated

from that of r_{4+5} by about twice length of *r-m* (Fig. 52). Hypopleura setulose just above coxa. Pteropleura quite bare. Mid tibia without a *pv* seta; hind tibia with the *pd* seta placed near three-fifths of length... . *Steelea* gen. n., p. 196

7 (6) *m* not or slightly upcurved, its tip lying behind wing tip and separated from that of r_{4+5} by four or more times length of *r-m* (Pl. 1, fig. 5).

8 (9) Mid tibia with a strong *pv* seta beyond middle; *pd* of hind tibia at apical sixth. *m* moderately upcurved, its apex only slightly farther from wing tip than that of r_{4+5} in front of tip, and separated from r_{4+5} by about four times length of *r-m*. Pteropleura and hypopleura quite bare..... *Fraseria* Mall., p. 199

9 (8) Mid tibia without a *pv* seta; *pd* of hind tibia near apical third or fourth. *m* hardly or not at all upcurved, its apex much farther from wing tip than that of r_{4+5} in front of tip, and separated from r_{4+5} by more than five times length of *r-m* (Pl. 1, fig. 5).

10 (11) *m* very slightly upcurved. Pteropleura with a group of setulose hairs just above posterior *stpl*; hypopleura setulose just above hind coxa. 3 well-developed *prst acr*..... *Phaonina* gen. n., p. 201

11 (10) *m* straight at apex. Pteropleura and hypopleura quite bare. Without distinct *prst acr*.. .. *Phaonidia* gen. n., p. 203

12 (1) Inner margin of lower calyptra diverging from margin of scutellum and longitudinal axis of fly from base onwards, the calyptra thus subtriangular with a strongly rounded apical margin (Fig. 45).

13 (14) Pteropleura with dense erect black setulose hairs. Upper half of face with a prominent nose-like keel or tubercle (Fig. 58). *m* strongly upcurved at apex. Arista long-plumose. Eyes bare. ♂ : Hind femur with a group of erect setulose hairs at apical fourth of *pv* surface. ♀ : Without cruciate interfrontals and proclinate orbitals..... *Rhynchomydaea* Mall., p. 206

14 (13) Pteropleura bare. Clypeus without a tubercle.

15 (22) Prosternum setulose.

16 (19) Metathoracic spiracle with black setulae. Hypopleura bare. R_5 widely open at apex.

17 (18) Node at base of r_{4+5} setulose on both dorsal and ventral surfaces. Supraspiracular convexity with erect black setulose hairs among the pale fine pile. *pd* seta of hind tibia conspicuous.. ... *Buccophaonia* gen. n., p. 212

18 (17) Node at base of r_{4+5} bare. Supraspiracular convexity with dense fine pile but without setulose hairs. *pd* seta of hind tibia small (at least in ♂)..... . . *Pictia* Mall., p. 210

19 (16) Metathoracic spiracle without black setulose hairs. Hypopleura finely setulose above.

20 (21) *m* strongly upcurved at apex where R_5 is less wide than twice the length of *r-m*. Node at base of r_{4+5} setulose on *d* and *v* surfaces. [*Sinomuscina* Ség.]

21 (20) *m* not curved forward at apex where R_5 is widely open. Node at base of r_{4+5} bare. Ventrobasal scale bare.* *pd* seta of hind tibia short.... .. [*Phaomusca* Mall.]

22 (15) Prosternum bare.

23 (36) Hind coxae bare behind.

24 (33) 1+2 *stpl.* Either with only 3 strong *post dc*, or the arista plumose. ♂: Fore femur without a subapical *v* excision.

25 (30) Arista plumose, longest hairs seldom much shorter than width of third antennal segment. Jowls almost always without conspicuous upcurved setae; if these are present, the aristal hairs exceeding length of diameter of third antennal segment, or 14 strong *post dc* present, *sc* markedly sinuate beyond *h* and strongly bent forward towards apex (*see* Pl. 21, fig. 12).

26 (27) *m* strongly upcurved at apex where R_5 is only slightly more than half as wide as at widest part. *pd* of hind tibia only moderately strong.

---

* If the ventrobasal scale is finely haired and the *pd* seta of the hind tibiae strong, see *Phaonia*. (Some specimens of *Phaonia simulans* Mall. have the prosternum more or less setulose; they differ from *Phaomusca bakeri* Mall. from Luzon by hairy ventrobasal scale).

♀ : With a pair of cruciate interfrontals; without proclinate orbitals. . . *Muscina* R.-D., p. 215

27 (26) *m* not or hardly upcurved at apex. *pd* of hind tibia strong and situated well beyond middle.*

28 (29) Jowls almost always without conspicuous upcurved setae; if these are present the aristal hairs longer than width of third antennal segment. ♂ : Frontal setae decreasing in length behind. ♀ : Without proclinate orbitals; seldom (*interfrontalis* sp. n.) with cruciate interfrontals. . . . *Phaonia* R.-D., p. 217

29 (28) Anterior part of jowls with 1–2 strong upcurved peristomal setae. Aristal hairs not as long as width of third antennal segment (in the Oriental species). Eyes practically bare. ♂ : Row of frontal setae ending behind in 1–2 stronger reclinate setae. ♀ : With a pair of proclinate orbitals and cruciate interfrontals. *Dendrophaonia* Mall., p. 283

30 (25) Arista short-haired or short-plumose, the longest hairs up to about half as long as width of third antennal segment. Jowls below in front of eyes with one very strong or a bunch of weaker upcurved setae. 3 strong *post dc.* ♀ : With a pair of strong proclinate orbital setae.

31 (32) Jowls with a bunch or group of upcurved bristles outward of the peristomal row (Fig. 78). Hairs on under side of arista subequal to those on upper side. *pra* long and strong. Wing length under 7 mm. Legs wholly black; halteres fuscous. ♂ : Hind tibia with a slight *v* apical process (Fig. 79). ♀ : With cruciate interfrontals. *Pogonomyia* Rond., p. 286

32 (31) Jowls with one very strong upcurved seta, which lies very little outward of the peristomal row (Fig. 80). Arista very short-haired, under side appearing virtually bare or with hairs which are hardly longer than its basal

---

* *pd* of hind tibia small and lying at middle; hypopleura bare in front of spiracle; see *Spilogona dimorpha*, p. 612.

diameter. *pra* small or absent. Wing length 8–11 mm. Femora and halteres yellow. ♂ : Apical *pv* part of fore femur with a multiple row of black setulae. ♀ : Without cruciate interfrontals. . . *Megophyra* gen. n., p. 289

33 (24) 0+1 or 1+1 (seldom 1+2 or 1+3) *stpl.* 4 *post dc*, in *Ophyra* the anterior ones sometimes very fine. Arista almost bare, the hairs not longer than twice its basal diameter. *sc* rather straight from shortly beyond *h* to costa (Pl. 2, fig. 19). Halteres (in Oriental species) always fuscous. Lunula with conspicuous silver-white pollinosity. ♀ : With both proclinate orbitals and cruciate interfrontals (Figs. 82, 83); hind tibia with 0–1 *pd* seta.

34 (35) Body glossy, often bluish-black, thorax without conspicuous brown dust. Hind margin of eyes in lateral view often with a quite conspicuous emargination (Fig. 82*a*). Apices of tarsal segments (especially on fore tarsi) sometimes narrowly creamy yellow. ♂ : Fore femur and tibia simple. ♀ : Frontal triangle large (except in an Australian subgenus) with straight or convex sides, the pores of the cruciate setae closely adjacent to, or on, its sides (Fig. 82*b*, *c*). . . . . *Ophyra* R.-D., p. 298

35 (34) Body not or only slightly glossy, not bluish, thorax with conspicuous or even dense brownish or whitish dust. Hind margin of eyes not emarginate. Apices of tarsal segments concolorous. ♂ : Fore femur with a pre-apical ventral excision and spines or spine-like setae (Fig. 84), fore tibia conspicuously emarginate near base opposite these structures. ♀ : Frontal triangle small, more or less dusted, with concave sides (Fig. 83); pores of cruciate interfrontal setae more or less conspicuously separated from its side margin. . *Hydrotaea* R.-D., p. 307

36 (23) Hind coxae with one or more setulae at apical margin of posterior surface. 1+1 *stpl.* Sixth wing vein unusually short and ending rather abruptly; apex of seventh curved, so that by further

extension these two veins would meet before wing margin. Arista short-pubescent. Hind tibia without a *pd* seta.* ♀ : With both proclinate orbitals and cruciate interfrontals. *Azelia* R.-D., p. 330

Genus 13. **Synthesiomyia** Brauer and Bergenstamm.

1893. *Synthesiomyia* B. & B., *Denkschr. Akad. Wien (math. nat.)*, **LX**, 96, 110. Genotype: (*brasiliana* B. & B., 1893 =) *nudiseta* Wulp, 1883.

Head with several rows of small setulae on facial ridges; eyes moderately approximated in male, widely separated in female; interfrontalia with small black setulae on posterior half, without cruciate setae; inclinate frontal setae not very strong, rather numerous, almost reaching level of ocellars, parafacialia with proclinate black setulae (finer and sparser in male) outwards of the inclinate setae; female with two small reclinate setae at level of ocelli; inner and outer verticals fine but usually both distinct in male, rather strong in female, postverticals conspicuous, ocellars distinct. Antennae shorter than face; arista appearing bare. *Thorax* with 1–3 weak *prst* and 1 *post acr*, 2+4 *dc*, 2 *ia*, the anterior one well behind level of *sa*, 1 *ph*, 1 *prst*, 3 humerals, 2 *npl*, 2 postalars; *pra* distinct but rather short; propleural, 2 upcurved prostigmals and a small anterior mesopleural well developed, 1+2 *stpl*; prosternum and upper and posterior parts of hypopleura setulose (Fig. 51); supraspiracular convexity with rather long fine brown hair; propleural depression, infra-alar bulla and pteropleura bare. *Abdomen* without setae except lateral marginals, and on the fourth segment 2–3 transverse rows at and near hind margin; hypopygium inconspicuous. *Wings* with *m* strongly but broadly curved forward, apex of R_5 not or only slightly wider than its base (Fig. 52); veins except *c* bare; subcostal sclerite without setulae. *Legs*: Fore tibia without a *p* seta but with two very small *ad* ones; mid femur without an *a* pre-apical, mid tibia without submedian setae except 1–3 small *p* ones, hind tibia with about two small *av*, *ad* and *pd* setae.

Distribution.—Monotypic and tropicopolitan.

---

* If a well-developed *pd* seta is present on the hind tibia, the species may belong to *Lasiops* s.l., which has not so far been found in the ORIENTAL REGION.

Biology.—Larva in decaying animal and vegetable matter, especially carcasses, *e.g.* of rats and hedgehogs, sometimes producing secondary myiasis in living animals including man. The larval hind end and posterior spiracles are seen in Fig. 11, *n* and *y*; the biology and early stages were described by Siddons and Roy, 1942, *Parasitol.*, **XXXIV**, 240.

76. **Synthesiomyia nudiseta** v. d. Wulp.

(Figs. 51, 52)

1850. ? *Cyrtoneura analis* Macq., *Dipt. Exot. Suppl.*, **IV**, 255; James, 1947, *U. S. Dept. Agric. Misc. Publ.*, 631, 123. Type: Chile (not Tasmania). Mus. Paris.

1883. *Cyrtoneura nudiseta* Wulp., *Tijdschr. Ent.*, **XXVI**, 42. Type: Argentine. Mus. Amsterdam or Leyden.

1893. *Synthesiomyia brasiliana* B. & B., *Denkschr. Akad. Wien (math. nat.)*, **LX**, 96. Type: Brazil. Mus. Vienna.

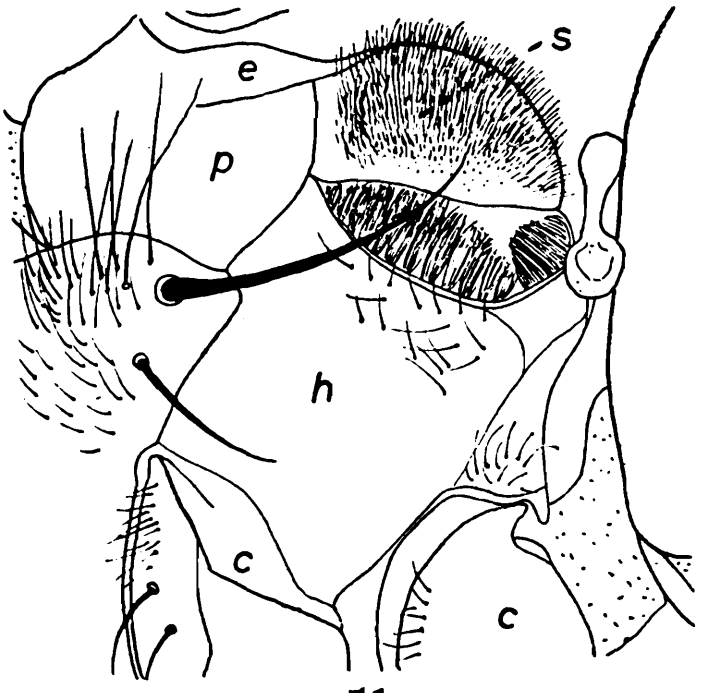
1893. *Hyadesimyia grisea* Giglio-Tos, *Boll. Mus. Tor.*, **VIII**, 5. Type: Mexico. Mus. Torino.

1908. *Gymnostylina schmitzi* Beck., *Mitt. Zool. Mus. Berl.*, **IV**, 196. Madeira. Mus. Berlin.

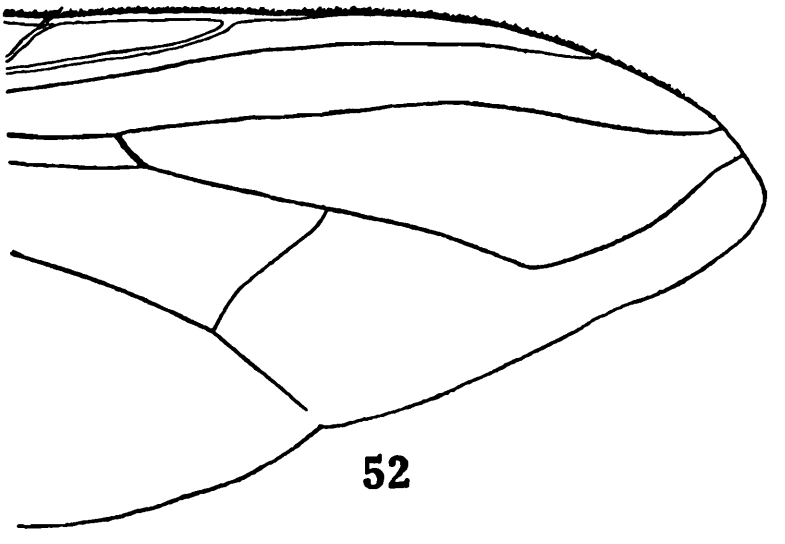
Head of male with face and more than anterior half of parafrontalia dusted silver-white, upper part of parafrontalia glossy black; eyes practically bare, separated by 0·16–0·2 times head-width; interfrontalia dull reddish-black, almost parallel-sided, thrice as wide as a parafrontale at middle; head of female dusted pale golden-yellow, only slightly more thinly so on upper part of parafrontalia, frons three-tenths head-width at vertex, slightly broadened to lunula, interfrontalia slightly narrowed behind, somewhat more in front, thrice as wide at middle as a parafrontale. Antennae and palpi deep orange, third antennal segment often browned along dorsal edge. *Thorax* black with conspicuous white dust and four almost complete black vittae, an additional pair of vittae on *post* part outwards of the *sa*; scutellum dull blackish-red, more thinly dusted on disc; anterior two *post dc* considerably weaker. *Abdomen* fuscous with moderately dense pale grey dust and the fourth segment more or less orange except usually on basal part; pollinosity with large shifting dark spots, in posterior view hind margins and often disc dark, especially in male. *Wings* with dark brown veins and wholly haired membrane; basicosta whitish-yellow. Lower calyptra greyish-white with white border and fringe, upper one with brown border and fringe. Halteres reddish-yellow. *Legs* dark brown, often partly lighter brown.

Length.—5–9 mm., of wings 6–8·3 mm.

Distribution.—INDIA: Calcutta; Bhowanipore. In the PALAEARCTIC REGION known from Madeira, Canary Isles, Egypt; in the whole of the ETHIOPIAN REGION including



51



52

FIGS. 51, 52. *Synthesiomyia nudiseta* (Wulp). Fig. 51, posterior lateral part of thorax. *c*, coxa; *e*, embossed upper part of pteropleura; *h*, hypopleura; *p*, pteropleura; *s*, supraspiracular convexity. Fig. 52, apical part of wing.

Cape Verde and Seychelles Isles; in the AUSTRALIAN REGION in Queensland, Samoa, Fiji, etc., Hawaii. In the NEW WORLD from N. Carolina and Texas to Brazil, Paraguay and Chile.

Genus 14. **Passeromyia** Rodhain & Villeneuve.

1915. *Passeromyia* Rodh. & Villen., *Bull. Soc. Path. exot.*, **VIII**, 592. Genotype: *heterochaeta* Villen.

1916. *Ornithomusca* Tns., *Insec. Inscit. menstr.*, **IV**, 45. Genotype: *victoria* Tns.

Head (Fig. 53) in both sexes dichoptic with cruciate interfrontals and without proclinate orbitals; inclinate frontal setae well developed, two reclinate setae one closely behind the other are present at level of ocelli, the anterior one smaller; ocellars moderately strong, inner and outer verticals strong; facial ridges with several rows of small black setulae to about middle. Third antennal segment very long; arista long-plumose, rays on under side short and very numerous, those on upper side long and more widely spaced. *Thorax* with 2–3+3(4) *acr*, 2+4 *dc*, 3 strong postalars; prosternum, propleura and pteropleura bare; hypopleura with setulose hairs just below spiracle; supraspiracular convexity with dense fine soft erect hair; suprasquamal ridge bare. Propleural, prostigmal and 1+2 *stpl* well developed. Scutellum with 4–5 pairs of strong marginals, the apical ones crossed. *Abdomen* without discals, marginals more distinct only on lateral surface and along apex of fourth segment; male hypopygium small. *Wings* with evenly haired membrane; veins bare except for a few setulae on ventral surface just beyond base of r_{4+5}; *m* broadly but rather strongly bent forward, R_5 less than twice as wide at apex as at base; subcostal sclerite and calyptrae without setulose hairs. *Legs:* Mid tibia without a *v* seta; hind tibia with a small *pd* seta beyond middle and with a conspicuous row of *ad* setulae and a stronger *ad* towards apical third.

Distribution.—ETHIOPIAN, ORIENTAL (extending into China) and AUSTRALIAN REGIONS.

Biology.—Eggs deposited in nests of small birds, where the larvae grow up as intermittent parasites, pupating in the nest (Rodhain & Bequaert, 1916, *Bull. scient. Fr. Belg.*, **XLIX**, 236; Rodhain, 1919, l.c., **LII**, 499). According to Patton (1920, *Ind. Journ. med. Res.*, **VIII**, 30) dead nestlings are also readily attacked.

Only one species seems to occur within the faunal limits, but *P. longicornis* Stein (without black setulae on postalar declivity, with only 2 *ia*, without a tessellate pattern of the abdominal pollinosity, and with dark palpi) occurs in Java and Sumatra. The Australian *P. indecora* Walk. (= *victoria* Tns.) has the postalar declivity and palpi as in *heterochaeta*

but the *ia* and abdominal pollinosity as or almost as in *longicornis*. Whether *Cyrtoneura longicornis* Macq. really belongs to this genus and whether it really came from Tasmania (*see* Hardy, 1929, *Proc. Linn. Soc. N.S. Wales*, LIV, 61) cannot be decided without seeing the type. There is thus no reason at present for replacing '*Muscina longicornis*' Stein by a new name, and the dark palpi, etc., of Macquart's species render it at least very doubtful if he can have had before him the only definitely-known Australian species of the genus.

77. **Passeromyia heterochaeta** (Villeneuve).

(Fig. 53)

1915. ! *Muscina heterochaeta* Villen., *Bull. Soc. ent. Fr.*, 225.
Types: N.W. Rhodesia, Belg. Congo, Kenya, China, B.M., Mus. Paris, etc.

Head dull reddish-yellow with black occiput and posterior third of jowls but pale cerebrale; dusted pale golden, on occiput whitish-grey; eyes hairy, in female more shortly so, separated at vertex in male by 0·27–0·29 times head-width, in female by nearly a third head-width; interfrontalia dull reddish, parallel-sided in anterior half, slightly narrowed in

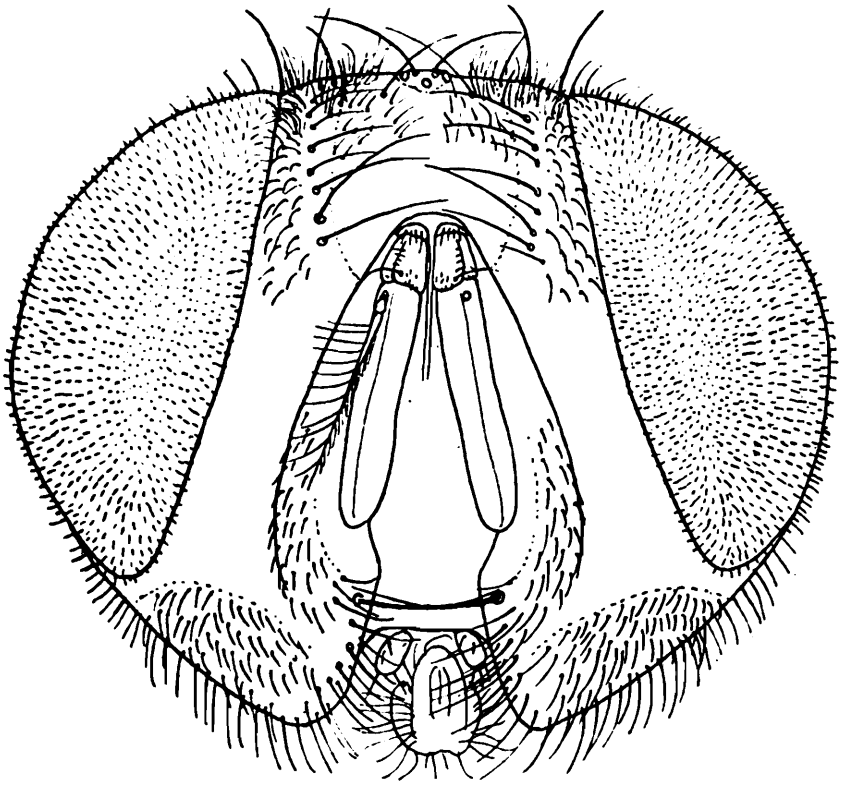


FIG. 53. *Passeromyia heterochaeta* Villen., head of male.

posterior half, which carries numerous fine small erect hairs on each side; parafrontalia at middle about a third width of interfrontalia, considerably broadened anteriorly, on each side with 6–8 inclinate setae and outwards with numerous fine black proclinate hairs. Palpi and antennae orange, third antennal segment infuscated, except at base. *Thorax* fuscous-black, rather densely dusted whitish-grey with 5 undusted vittae, the outer ones very incomplete and sometimes absent; scutellum broadly dull reddish-yellow on apical part; 3 *ia*, the anterior one smaller, rarely indistinct, sometimes fine and duplicated; postalar declivity with black setulae. *Abdomen* densely grey-dusted with large somewhat shifting dark spots; these consist in most directions of a broad transverse spot on either side at base of posterior three segments, a transverse median spot on hind margin of intermediate segments, and an elongate median spot on fourth segment. *Wings* slightly milky, with light brown veins, R_5 only slightly wider at apex than at base; epaulet pale ferruginous, basicosta pale testaceous. *Legs* piceous-brown, fore tibia with two small *p* setae.

Length.—6·7–10·2 mm., of wings 5·8–8·5 mm.

Distribution.—ETHIOPIAN REGION. CEYLON. INDIA (Coonoor, Madras; Simla Hills, Punjab; Lucknow, U.P. (Uttar Pradesh); Calcutta, Bengal). BURMA. S. CHINA (Canton). FORMOSA.

A female cotype from Chilanga, N.W. Rhodesia, 31.VII.13, in house (*R. C. Wood*) in the B.M. is herewith selected as the type.

Genus 15. **Steelea** gen. n.

Head (Fig. 54) holoptic in male, dichoptic in female; ocellars well developed, cruciate interfrontal setae present but weak in female; verticals indistinct in male, strong in female; facial ridges with several rows of small decumbent setulae, vibrissae very slightly above mouth-margin; arista long-plumose, the rays of almost even length, suddenly stopping at apical third. *Thorax* with 3+2 *acr*, 2–3+4 *dc*, 2 *ia*, 3 humerals, 1–2 *ph*, 1 *prst*, 2 *npl*, 1 well-developed *pra*, 2(–3) *sa*, 2 postalars; propleural moderately strong with some long and strong setulose hairs adjacent, 3 strong prostigmals, anterior mesopleural distinct, 1+2 strong *stpl* arranged in a triangle with an obtuse angle of *c.* 110°; prosternum, propleural depression, pteropleura and infra-alar bulla bare, hypopleura with some setulose hairs only just above hind coxa, supraspiracular convexity with dense brown hairs

(about as long as fringe of lower calyptra), suprasquamal ridge and postalar declivity bare. Scutellum markedly flattened, especially towards apex, which forms a rather narrow edge, with 4 pairs of marginals, the first and third much weaker, the apical pair cruciate; haired to lower edge. *Abdomen* subcircular-cordate, not very convex, anterior three segments with lateral marginals, fourth with discals in two irregular transverse rows and a row of marginals; male hypopygium small and not projecting. *Wings* with wholly haired membrane, all veins (except costa) bare, *m* broadly but strongly rounded forward, reaching costa slightly in front of wing tip (Fig. 55) where it remains separated from r_{4+5} by about twice length of *r-m*; subcostal sclerite without setulae; calyptrae of *Musca* type, without setulae on disc. *Legs* rather strong, fore tibia without *p* but with some very small *ad* setae; mid femur without an *a* but with two *p* (*p* and *pd*) pre-apicals, in basal half with a row of not very long *av* and *pv* setae, mid tibia without *a* or *v* but with 3 *p* and *pd* setae, hind femur of ♀ (of ♂ unknown) with a row of *ad* (almost *d*) setae, a *pd* (almost *d*) pre-apical and a row of strong *av* setae, hind tibia with about 5 *ad* setae of unequal size, with 3 rather small *av*, and with a row of small *pd* setae from base to beyond middle and a strong *pd* near three-fifths of length.

Genotype.—Steelea pales sp. n.

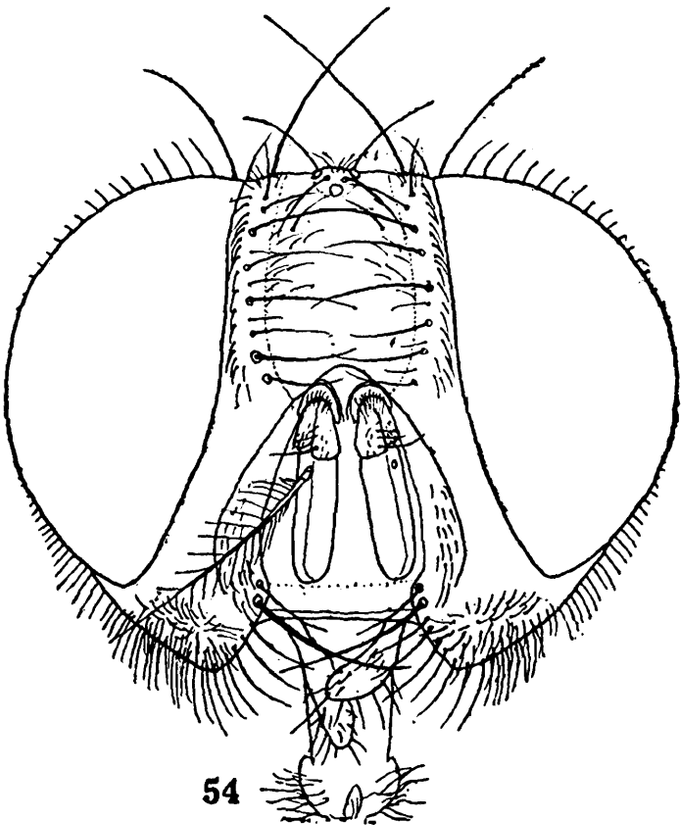
The genus is named in honour of Miss Margaret Steele, to whom the British Museum (Natural History) owes important collections of Diptera from the ETHIOPIAN REGION and Assam.

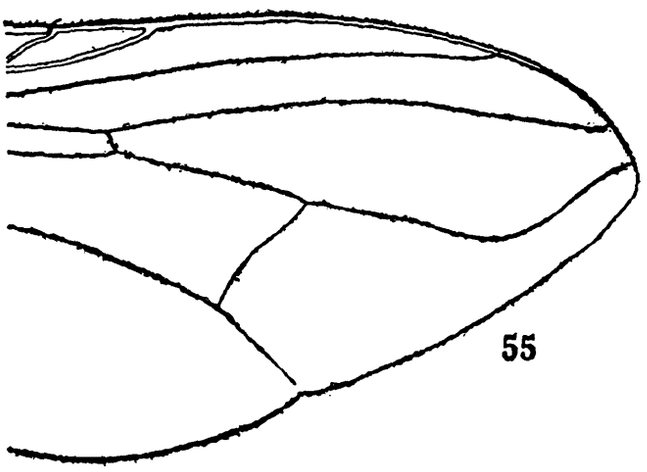
78. **Steelea pales** sp. n.

(Figs. 54, 55)

♂ ♀: Fuscous-black with apical part of scutellum and in male lateral parts of abdomen dull rufous translucent; in dorsal view hardly, in posterior view moderately densely, dusted whitish-grey. *Head* with pale golden lunula, parafacialia dusted silver-white, in female the upper half slightly embossed, with dark reflections, parafrontalia with silver-white dust, especially on anterior part; eyes bare, in male subcontiguous (separated by $\frac{1}{20}$ head-width), interfrontalia linear in upper half, frontal setae well developed, reaching level of anterior ocellus, parafrontalia otherwise bare; in female vertex more than a quarter (0·27) head-width, frons evenly dilated to lunula, where it is 0·35 times head-width, interfrontalia slightly narrowed at extremities, thrice as

wide at middle as a parafrontale, the latter with strong inclinate setae and to their outer side a row of black proclinate setulae. Palpi bright orange, laterally compressed and in lateral view appearing markedly clavate; basal antennal segments brown, somewhat reddish translucent, base of





FIGS. 54, 55. *Steelea pales* sp. n. Fig. 54, head of female. Fig. 55, apical part of wing.

third reddish-orange. *Thorax* with four somewhat suffused undusted vittae. *Abdomen* on intermediate segments in posterior view with elongate wedge-shaped median spots,

which form an incomplete median vitta, and with slight shifting reflections. *Wings* subhyaline with a brownish tinge and brown veins; epaulet and basicosta black; upper calyptra subhyaline with dark brown border and fringe, lower calyptra pale brownish-grey with whitish border and fringe. Halteres infuscate. *Legs* piceous-brown to black.

Length.—10 mm., of wings 8·2–9·2 mm.

Distribution.—INDIA: Assam: Chanliang, 4,840 ft., Delai Valley, Mishmi Hills, 25.XI.36 (*M. Steele*), ♀ type (in B.M.); Pakistan: Chhanglagali, Abbottabad Dist., 8,450 ft., 3.X.28 (*H. S. Pruthi*), 1 ♂ paratype (without hind legs) (Indian Mus., Calcutta); Sikkim, E. Himalayas (*de Niceville*), ♂ (?) thorax and wings (Indian Mus., Calcutta).

In size and shape somewhat reminiscent of the Tachinid genus *Pales*.

Genus 16. **Fraseria** Malloch.

1932. *Fraseria* Mall., *Ann. Mag. n. H.* (10), X, 309. Genotype: *F. fulvomaculata.*

Head with hairy eyes, which are separated by a wide frons (♀, male unknown), interfrontalia hairy on upper half, without cruciate setae, parafrontalia densely setulose outwards of the inclinate setae, which are strong but do not quite reach level of anterior ocellus, without proclinate but with two rather small reclinate setae; ocellars and inner and outer verticals strong; visible part of facial ridges with several rows of black setulae; vibrissae hardly above mouth-margin. Antenna plumose, longest rays somewhat longer than diameter of third antennal segment. *Thorax* with 3+2–3 *acr*, none of them between suture and level of *sa*, 3+4(–5) *dc*, 2 *ia*, *pra* subequal to second *npl*, 3 humerals, 2 *npl*, 1 *ph*, 1 *prst*, 2 *sa*, 2 postalars; propleural and 2 prostigmals strong, anterior mesopleural distinct, 1+2 *stpl*, arranged in a triangle with an obtuse angle of *c.* 100°; prosternum, propleural depression, infra-alar bulla, pteropleura, hypopleura, suprasquamal ridge and postalar declivity bare. Scutellum with four pairs of marginals, the first and third markedly weaker, hairs reaching lower edge. *Abdomen* hardly longer than wide, without distinct setae, except for 1–2 at hind angles of anterior three segments, dorsal surface of fourth with some longer and stronger hairs among the decumbent hair, ventral surface of fourth segment with rather dense erect fine hair. *Wings* with evenly haired membrane, veins (except costa) quite devoid of setulae; R_5 moderately narrowed at apex, *m* being markedly, but not

strongly, upcurved. Subcostal sclerite without setulae; lower calyptra of *Musca* type, without setulae on disc. *Legs* moderately slender; fore tibia with a *pv* towards apical, third and a very small *ad* near middle; mid femur with two *p* but without an *a* pre-apical, mid tibia with a strong *av* near apical third and 2–3 very small *p* and *pd* setae; hind tibia with a *pd* seta at apical sixth (in addition to the *d* and *ad* pre-apicals a little nearer apex), a conspicuous rather dense fringe of short *ad* setae from base to apex; a somewhat less developed *pd* fringe, and 2–3 rather weak *av* setae beyond middle.

Distribution.—MALAYA. BURMA.

79. **Fraseria fulvomaculata** Malloch.

1932. ! *Fraseria fulvomaculata* Mall., *Ann. Mag. n. H.* (10), **X**, 309. Type: Fraser's Hill, Malaya. In B.M.

Fuscous with pale ferruginous shoulders, scutellum, base of abdomen, part of pleurae; rather densely dusted whitish-grey. *Head* dusted silver-grey with shifting reflections, in some directions either the face or the parafrontalia appearing dark; frons (♀) at vertex almost or fully three-tenths head-width, hardly widened to lunula, interfrontalia slightly narrowed in front and behind, four times as wide at middle as a parafrontale, the latter with 6–8 inclinate setae. Palpi and antennae fuscous, the proximal two antennal segments infuscate light brown. *Thorax* rather densely dusted with four conspicuous black vittae and behind the suture another pair along the *pra* and *sa*; anterior *ia* level with the *sa*; propleura, infra-alar bulla, hind part of pteropleura and of sternopleura pale ferruginous. *Abdomen* with the first segment pale ferruginous above and below but with a darkened linear hind margin, second segment pale on under side and outer third or half of each half of dorsal surface, third with or without a small pale spot in each hind angle, fourth with the hind margin suffusedly pale. *Wings* subhyaline, somewhat ochraceous suffused along the veins, which are brown with pale ferruginous bases. Calyptrae greyish-white, becoming pale ochraceous on outer part. Halteres reddish-yellow. *Legs*, including coxae, testaceous, tarsi fuscous.

Length.—9·5–10·0 mm., of wings 9·4 mm.

Distribution.—MALAYA (Fraser's Hill, Pahang). N.E. BURMA (Kambaiti, 2,000 mtr.).

Malloch describes the length of the type as 11 mm., but it does not quite reach 10 mm. I have only seen the type and a single female collected by R. Malaise.

Genus 17. **Phaonina** gen. n.

Head (Fig. 56) with eyes well separated in male, more broadly separated in female; cruciate interfrontal and proclinate orbital setae absent, ocellars present, but smaller in male, inner and outer verticals indistinct in male, short but strong in female, both sexes with a pair of strong postocellars, which in male are stronger than the ocellars; lower third of facial ridges with several rows of setulae, vibrissae at mouth-margin; arista long-plumose, the rays gradually becoming somewhat shorter from basal third onwards. *Thorax* with 3+2(3) *acr*, none of them between suture and level of *sa*, 2(3)+4–5 *dc*, 1–2 *ia*, 3 humerals, some hairs towards the pleura rather strong and thus tending to form an auxiliary smaller *ph*, *prst*, etc., 2 *npl*; propleural and prostigmal strong, anterior mesopleural distinct, 1+2 *stpl*, arranged in a triangle with an obtuse angle of *c.* 110° at lower *stpl*; prosternum, propleural depression, infra-alar bulla, suprasquamal ridge and postalar declivity bare, pteropleura bare except for a tuft of setulose hairs slightly above and behind the posterior *stpl*, hypopleura bare except for some black hairs just above hind coxa. Scutellum with three strong marginals, including the decussate apicals and a moderately strong basal marginal, a pair of pre-apicals and on each side 3–5 irregular discals towards apex, lateral surface setulose to ventral margin. *Abdomen* not longer than wide, each segment with a row of weak marginals, which become somewhat stronger at sides, those of fourth segment rather strong, this segment with numerous discals, which are arranged irregularly; male hypopygium hardly projecting. *Wings* (Pl. I, fig. 5) with evenly haired membrane, veins bare on upper side, but the under side with a few small setulae on *sc* just beyond *h* and on node at base of r_{4+5}; R_5 hardly narrowed at apex, *m* only just noticeably bent up at tip. Subcostal sclerite without setulae; lower calyptra of *Musca* type, without setulose hairs on disc. *Legs* robust, fore tibia without a submedian seta; mid femur without an *a* but with two *p* pre-apicals, mid tibia with only a *p* seta at middle and a *pd* at apical fourth; hind tibia with a *pd* towards apical third.

Genotype.—*Phaonia corbetti* Mall.

Distribution.—Malaya. Solomon Islands.

Biology.—Both in Malaya and in the Solomon Islands the flies were obtained from male inflorescences of *Nipa fruticans* (Palmae) in which the larva lives, ' damaging them extensively ' (Corbett, 1931, *Malay. agric. J.*, **XIX**, 36; Sewell, *ibid.*, 233).

80. **Phaonina corbetti** (Malloch).

(Fig. 56)

1931. ! *Phaonia corbetti* Mall., *Ann. Mag. n. H.* (10), **VII**, 187.
Types: Kuala Selangor. B.M.

Fuscous with moderately thick grey dust and vestiges only of an outer pair of dark thoracic vittae. *Head* with silver-grey dusted face and parafrontalia, interfrontalia black (in teneral specimens dull reddish); eyes virtually bare, in male separated by $\frac{1}{8}-\frac{1}{11}$ head-width, frons only very slightly widened above and moderately widened below, interfrontalia more nearly parallel-sided, 3–4 times as wide at middle as a parafrontale, the latter almost linear, somewhat

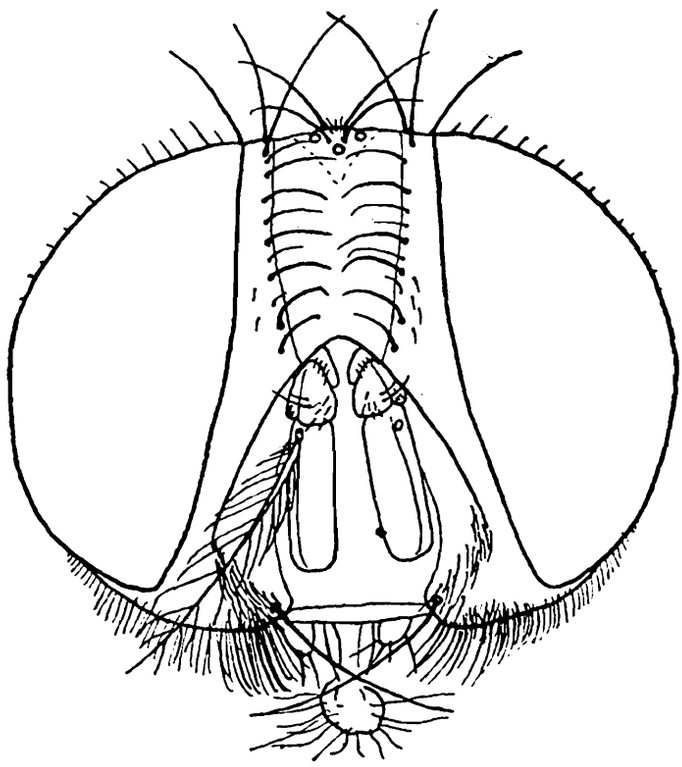


FIG. 56. *Phaonina corbetti* (Mall.), head of female.

broadened in anterior half, inclinate setae moderately strong, especially in front, reaching level of anterior ocellus behind, parafrontalia otherwise bare; in female frons slightly over a quarter head-width at vertex, evenly dilated to one-third head-width at lunula, interfrontalia almost parallel-sided, very slightly narrowed to extremities, 3–4 times as wide at middle as a parafrontale, frontal setae as in male but stronger, a row of small black proclinate setulae to their outer side. Palpi and antennae fuscous-black, base of third antennal segment narrowly reddish. *Thorax* with the dust becoming

golden-brown on posterior part of disc, the inner pair of vittae sometimes noticeable in certain directions, the outer one represented by a darker spot outwards of the *dc* before and behind suture; setae, etc., as in generic description. *Abdomen* moderately densely grey-dusted with a complete narrow black median vitta on second and third segments, with small undusted dots at the base of the hairs and setae, and usually with some brownish dust on either side of disc, especially on posterior part of each segment. *Wings* somewhat brownish subhyaline with brown or testaceous veins. Lower calyptra whitish-grey, in male often somewhat brownish on posterior part. Halteres dull reddish-yellow. *Legs* fuscous, setae as in generic description, hind tibia in addition with a not very strong *ad* seta just beyond middle and with 1–2 fine *av* setae.

Length.—5·2–6·5 mm., of wings 5·7–7·8 mm.

Distribution.—MALAYA (Kuala Selangor). SOLOMON IS. (Guadalcanal).

Genus 18. **Phaonidia** gen. n.

Head (Fig. 57) holoptic in male with fine but distinct inner and outer verticals and rather weak ocellars, postocellars finer than these, upper half of clypeus raised to form a blunt keel between antennae (which are missing in type); vibrissa conspicuously above mouth-margin, which is not produced, vibrissal angle hardly so, less so than anterior part of frons, lower two-fifths of facial ridges with several rows of setulae; occipital dilation indistinct, restricted to an irregular row of setulae on outer side of peristomal setae. *Thorax* with 0+1 strong *acr*, but 2–3 of the *prst* hairs somewhat longer and stronger if viewed laterally, 2+3 strong *dc*, 2 strong *ia*, other setae as usual, *pra* strong, longer than second, and subequal to first, *npl* hair long, erect and rather dense, even on notopleura; auxiliary prostigmal subequal to main prostigmal, anterior mesopleural distinct, a slightly weaker seta just below it (always ?), 1+2 *stpl* arranged in a triangle with an angle of less than 80° at lower *stpl*, which lies almost vertically below posterior one; prosternum, propleural depression, pteropleura, hypopleura, infra-alar bulla, suprasquamal ridge and postalar declivity bare, as are the under side and the lower part of the lateral surface of scutellum; the latter with a moderately strong basal and a strong subapical in addition to the normal strong lateral and decussate apical marginals; posterior spiracle large and with a felt-like operculum, without dark setulae. *Abdomen* about as long as wide, second to fourth segments with a row of marginals;

these are weak on second and preceded by an irregular row of long setulose hairs on third; fourth segment also with numerous irregularly arranged discals; hypopygium rather large, but only slightly projecting. *Wings* with bare veins except apparently for a setula on r_1, just beyond *h*, subcostal sclerite without setulae; R_5 dilated to apex, *m* not upcurved. Subcostal sclerite and lower calyptra as in *Phaonina*. *Legs* rather slender; fore tibia without submedian setae; mid femur without an *a* but with 4 *p* to *d* pre-apicals, mid tibia with 2 strong *p* setae; hind tibia with a strong *pd* seta at apical fourth (right hind tibia of type with another even somewhat stronger *pd* at middle).

Genotype.—*Phaonidia calyptrata* sp. n.

Distribution.—N.E. BURMA.

81. **Phaonidia calyptrata** sp. n.

(Fig. 57)

♂: Fuscous with rather dense whitish-grey dust and 4 (behind suture 6) fuscous-dusted vittae; scutellum ferruginous translucent, conspicuously dusted, thoracic sutures pale ferruginous; spiracles pale reddish-yellow; abdomen with small shifting dark dots which coalesce into irregular spots; palpi brown; legs pale ferruginous with piceous tarsi. *Head* rather densely dusted whitish-grey, parafrontalia more whitish outward to the setae, parafacialia with a shifting dark streak along eye margin at level of second antennal segment; eyes contiguous, densely long-haired, interfrontalia obsolete in upper half and forming a somewhat elongate piceous-brown triangle in lower half, parafrontalia linear in upper half, moderately dilated below, where a dense row of 7–8 inclinate setae is present, parafacialia of even width, slightly wider than apical part of fore tibia and conspicuous in profile, and jowls thrice as wide. *Thorax* with moderately broad vittae, the paramedian ones not reaching middle level between first and second *post dc*, the outer ones broadly interrupted at suture and very incomplete behind; hair of dorsal surface fuscous, of pleurae and ventral surface pale golden (but setae black); *post acr* hairs dense, erect and rather long, about 15 forming an irregular transverse row, 2–3 of the hairs somewhat longer and stronger, so that a tendency towards the formation of some weak *prst acr* setae seems to exist, first *prst dc* subequal to second, second *post dc* markedly more distant from first than from third, anterior *ia* level with *sa*. *Abdomen* in posterior view with a narrow

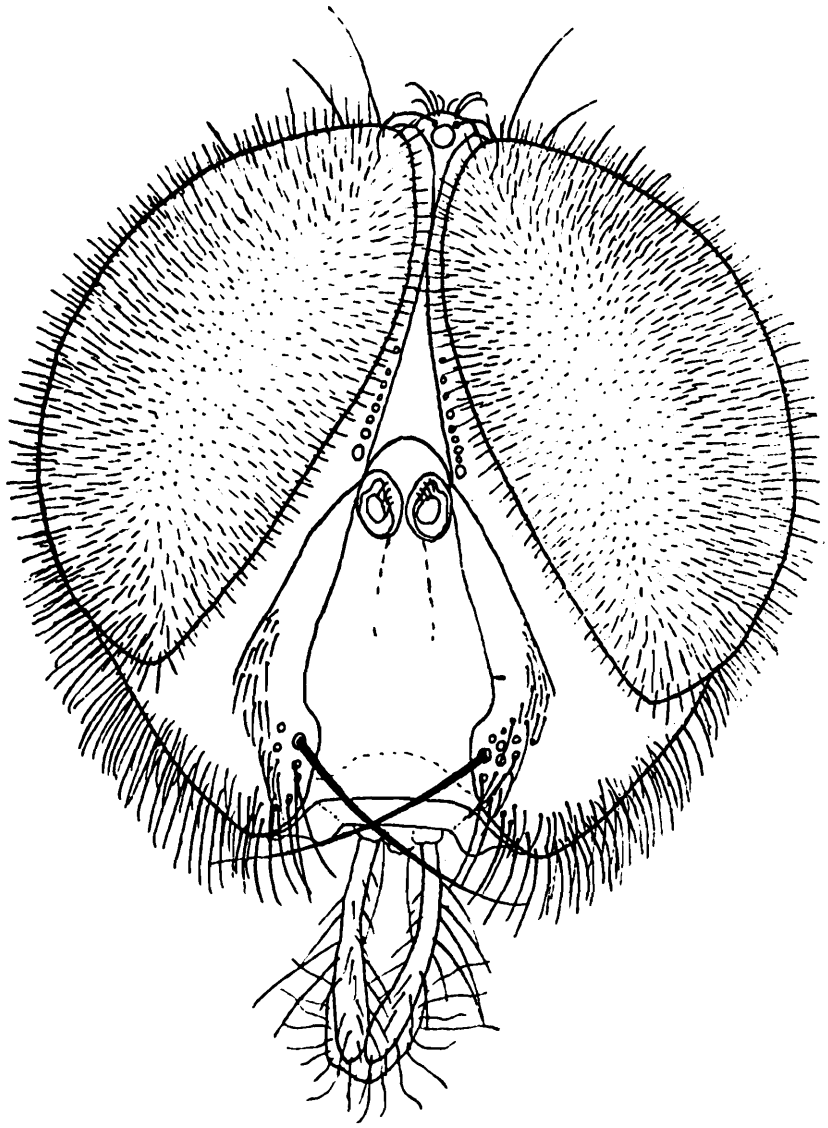


FIG. 57. *Phaonidia calyptrata* sp. n., head of male.

fuscous median vitta, which on posterior segments is less pronounced because of the more developed coalescing shifting spots, fourth segment rather broadly truncate, hair short and decumbent on dorsal surface of anterior three segments, long, fine and erect on dorsum of fourth segment and on ventral surface, fuscous dorsally, pale golden ventrally. *Wings* with evenly haired membrane, r_1 much exceeding level of *r-m*, which lies at middle of discal cell; r_{4+5} somewhat sinuous, *m* very slightly curved downward at middle of apical section; *m-m* oblique and somewhat sinuous. Calyptrae pale reddish-ochraceous, lower one more greyish on disc, border paler, fringe pale golden. Halteres reddish-yellow. *Legs* with black setae and hairs, but the hair on basal two-thirds of *v* surface and base of femora pale

golden, long, fine and erect; *v* surface of fore tibia with dense half-erect hair, which forms a fringe half as wide as tibial diameter; mid femur with 4–5 not very strong *pv* setae on basal half; hind femur with a complete row of long *av* setae, which become denser, stronger and shorter towards apex, most of them more than twice as long as width of femur and with paler apical part, *pv* surface with more than a dozen similar setae on basal three-fifths, this row suddenly changing to a row of setulose hairs on apical part, hind tibia with a row of conspicuous *ad* setulae, one of which beyond middle is replaced by a stronger seta, *pd* surface with a less developed row of setulae, *av* surface with four outstanding setulose hairs on third quarter.

Length.—9·8 mm., of wings 10·0 mm.

Distribution.—N.E. BURMA: Kambaiti, 2,000 m., 4.VI.34 (*R. Malaise*), ♂ type (Mus. Stockholm).

Genus 19. **Rhynchomydaea** Malloch.

1922. *Rhynchomydaea* Mall., *Ann. Mag. n. H.* (9), **X**, 134; 1923, *Proc. Linn. Soc.* N.S.W., **XLVIII**, 604; 1925, *idem*, **L**, 40; 1926, *idem*, **LI**, 48, 554. Genotype: *Mydaea tuberculifacies* Stein.

Head of male holoptic, of female (Fig. 58) dichoptic with one strong reclinate seta, eyes bare, upper part of clypeus with a conspicuous short longitudinal keel or tubercle, mouth-margin somewhat produced between vibrissae, arista long-plumose. *Thorax* with 0+1 *acr*, 2+4 *dc*, only 1 *ia* (the posterior one), well-developed *pra* and anterior mesopleural; sides of scutellum setulose down to ventral margin; auxiliary prostigmal absent, prosternum and propleural depression bare, 1+2 *stpl*, pteropleura conspicuously setulose. *Abdomen* subcircular-subcordate in outline with distinct setae only laterally and towards apex. *Wings* with bare veins except for some setulae on both ventral and dorsal surfaces of base of r_{4+5}, *sc* conspicuously sinuous and upcurved to costa, tip of *m* strongly upcurved, sixth and seventh veins not reaching wing margin. Lower calyptra of *Phaonia* type. *Legs:* Fore tibia without submedian setae; mid femur (in the genotype) without an *a* pre-apical, mid tibia without *ad*, *av* or *pv* submedian setae; hind tibia with a very small *pd* seta near apical third or fourth, *ad* pre-apical entirely absent.

Distribution.—CEYLON. JAVA. SUMATRA.

In describing the genus in 1922 Malloch designated *tuberculifacies* as type and added a new *Rh. australis* Mall. He

considered *Mydaea carinata* Stein as possibly belonging to this genus, both the latter species being Australian. In 1923 he confirmed that *carinata* is a *Rhynchomydaea*, and in 1925 he included the genus in a key to the Australian genera of *PHAONIINAE*, placing it in the section with bare pteropleura, whereas this sclerite is conspicuously setulose both in Malloch's type of *australis* and the Ceylonese specimens of *tuberculifacies* studied by him in 1922 and now in the B.M. In 1926 he described from W Australia a new species *pollinosa*, in which *m* is not upcurved, and later (p. 554) he stated that he had included in the genus species with both bare and hairy pteropleura. He therefore created for the latter the new genus *Hardyia* with the genotype *carinata* Stein. Unfortunately neither *pollinosa* nor *carinata* are in the B.M. but it is probable that the only species with bare pteropleura is *pollinosa*, in which *m* diverges almost evenly from r_{4+5}. *Hardyia* would then include *carinata* and *australis*, and according to Malloch's various statements would appear synonymous with *Rhynchomydaea*. However, *australis* differs from the genotype of *Rhynchomydaea* by the absence of a *pd* seta from the hind tibia and the presence of a small *a* pre-apical on the mid femur and an *ad* pre-apical on the hind tibia. It appears probable, therefore, that the Oriental and Australian species included by Malloch in *Rhynchomydaea* are not really closely related and that the true *Rhynchomydaea* (*tuberculifacies*) should be placed in PHAONIINI, whereas *Hardyia* probably belongs to MYDAEINI.

82. **Rhynchomydaea tuberculifacies** (Stein).

(Fig. 58)

1909. *Mydaea tuberculifacies* Stein, *Tijdschr. Ent.*, **LII**, 224, 226.
1922. *Rhynchomydaea tuberculifacies* (Stein), Mall., *Ann. Mag. n. H.* (9), **X**, 135, ♀ ; 1928, *Ent. Mitt.*, **XVII**, 326, ♂. Type: Batavia. Mus. Amsterdam.

Ferruginous with most of head and mesonotum fuscous, apex of fourth tergite broadly orange, apical part of abdomen otherwise infuscated, pleurae partly infuscated, antennae yellowish-orange, palpi and legs pale ferruginous, but tarsi piceous. *Head* rather densely dusted pale grey, parafacialia and parafrontalia more silver-white, jowls and lower part of occiput ferruginous translucent, clypeus and its tubercle pale testaceous translucent; eyes bare, in male contiguous, interfrontalia visible above as a very elongate small triangle, below as a rather narrow triangle which extends over little more

than anterior third of frons, parafrontalia linear in posterior half, evenly somewhat dilated in anterior half, with 1 strong inclinate seta at lunula and about 15 hair-like shorter and longer setulae from there to ocelli, ocellars weak, verticals very small, not very distinct; frons of female almost three-tenths (0·28–0·29) head-width at vertex, almost parallel-sided with straight sides to near lunula, slightly dilated close

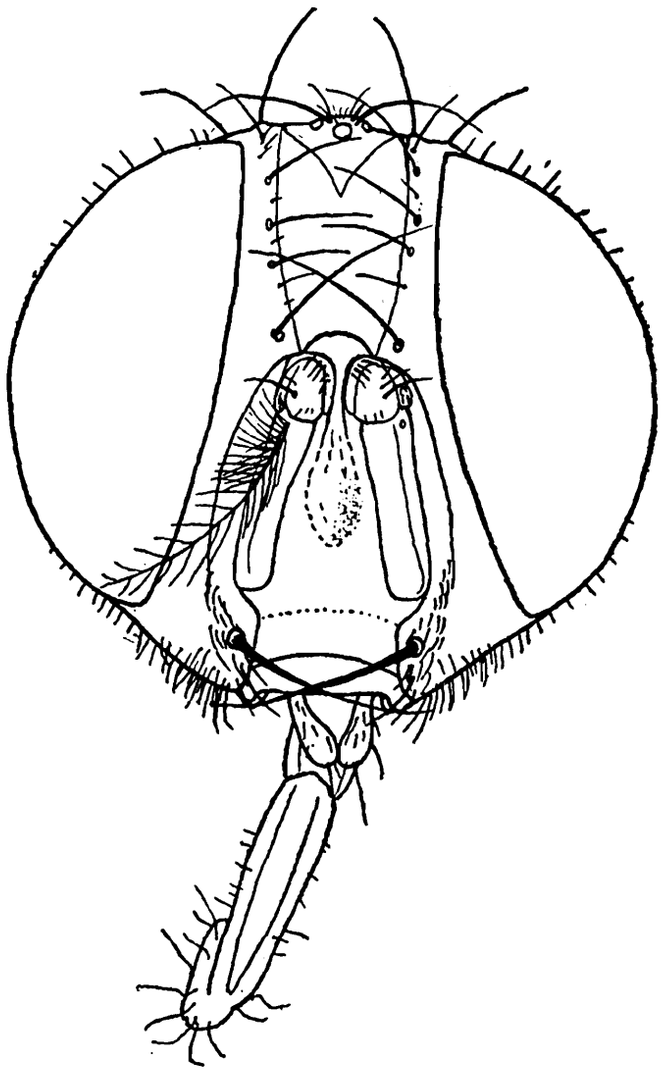


FIG. 58. *Rhynchomydaea tuberculifacies* (Stein), head of female.

to lunula, where it is almost a third (0·31–0·32) head-width, frontal triangle very small, indistinctly drawn out to near middle, interfrontalia evenly and rather conspicuously narrowed in anterior half, 3½–4 times as wide at middle as a parafrontale, the latter with 3–4 strong inclinate setae and 1–3 small ones between each two adjacent strong setae, ocellars and verticals moderately strong; parafacialia half,

jowls almost thrice, as wide as third antennal segment, which reaches a transverse depression above mouth-margin, separated from it by about width of third antennal segment; arista densely long-plumose with the dorsal rays in two rows, the rays very slowly becoming shorter from middle onwards, longest rays 3½ times as long as width of third antennal segment. *Thorax* densely dusted yellowish-grey, the dust more bluish-white on anterior part of disc, paramedian vittae very narrow, parallel, reaching level of second *post dc*, outer vittae reduced to a triangular streak to the inner side of the *ph* and *prst* and a short vitta to the outer side of the anterior 2–3 *post dc*, *prsc* and anterior *post dc* rather small; scutellum pale ferruginous, its disc not very thickly dusted pale grey or cinereous-grey; hypopleura with some fine hairs near spiracle and above hind coxa. *Abdomen* moderately densely dusted pale grey; intermediate segments in female (and sometimes male) with a roundish shifting spot near lateral margin, and with a small round fuscous spot at base on each side of median line; anterior segments with not very strong lateral marginals, third with similar lateral discals and a row of marginals, which become weak (♂) or indistinct (♀) towards middle, fourth with a row of discals and marginals, the former interrupted at middle. *Wings* greyish subhyaline with a yellowish tinge, especially on anterior basal part; r_1 slightly exceeding level of *r-m*, the latter at or towards three-fifths of discal cell, r_{2+3} rather long, gently curved backward and curved upward at apex, costal sector in R_1 therefore more than twice as long as that in R_3, r_{4+5} gently curved backward and markedly sinuous, *m* strongly upcurved, R_5 thus as in *Muscina*, *m-m* hardly oblique, slightly concave outwardly or almost straight. Calyptrae pale brownish-grey or ochraceous-grey with concolorous border and pale golden fringe. Halteres pale reddish-yellow. *Legs:* Mid femur with 2 rows of small but rather stout *a* setae on more than basal half and an *av* and *pv* row of slightly longer hairs, 3–5 of them near middle being markedly longer and erect in male, mid tibia with 2 strong *p* setae; hind femur without *pv* setae, but in male with a group of erect *pv* setulose hairs at apical fourth, with only 1–3 *av* setae towards apex, the most distal one of them near apical fifth forming a strong pre-apical, hind tibia with an *ad* at middle and 3–5 weak *av* setae.

Length.—5·5–6·4 mm., of wings 5·4–6·3 mm.

Distribution.—CEYLON. JAVA. SUMATRA.

Biology.—Two specimens were found on flowers by R. Senior White.

Genus 20. **Pictia** Malloch.

1926. *Pictia* Mall., *Phil. J. Sci.*, **XXXI**, 502. Genotype: *Spilogaster xanthoceras* Walk.

Head with the naked eyes somewhat separated in male, where the verticals and postverticals are weak, ocellars strong, interfrontalia broad, parafrontalia narrow and bare except for the inclinate setae; upper half of face with a conspicuous though low keel between the antennae. Third antennal segment very long, arista long-plumose. *Thorax* with 0+1 *acr*, 2+3 *dc*, the anterior *prst dc* rather small, only the posterior *ia* present, rather strong, *pra* and second *npl* subequal but considerably shorter than first *npl*; auxiliary prostigmal (above the normal strongest one) well developed, anterior mesopleural distinct; prosternum setulose at sides, propleural depression and pteropleura bare, hypopleura with some black hair on lower posterior part, metathoracic spiracle fringed with dense black setulae except along upper margin, supraspiracular convexity without setulae but with dense yellowish pile, postalar declivity and lateral and ventral surfaces of scutellum bare. *Abdomen* elongate with strong lateral marginals on anterior two, and a strong marginal row on posterior two segments. *Wings* with the upper and underside of all veins (except costa) bare of setulae; r_{4+5} and *m* not converging, but the former very slightly sinuous near apex, and *m* almost unnoticeably upcurved at tip, sixth vein incomplete. Lower calyptra strongly projecting. *Legs* elongate; mid tibia with only *p* submedian setae (according to Malloch); *pd* seta of hind tibia with the *pd* seta at apical fourth very fine (at least in male), *pv* apical seta absent, *ad* pre-apical seta well developed though shorter than the *d* pre-apical.

By its slender build and its pattern the only species looks more like a large *Limnophora* than a member of the present group, to which, however, it undoubtedly belongs.

83. **Pictia xanthoceras** (Walker)

(Fig. 59)

1860. !*Spilogaster xanthoceras* Walk., *Proc. Linn. Soc. London*, **IV**, 141 (‘♀’). Type: Macassar. B.M.

1901. *Spilogaster xanthoceras* Walk., Stein, *Z. Hymen. Dipt.*, **I**, 216 (♂).

1926. *Pictia xanthoceras* (Walk.) Mall., *Phil. J. Sci.*, **XXXI**, 502; 1928, *Ent. Mitt.*, **XVII**, 317.

♂ : Piceous with whitish-grey and brown dust, forming an *Anthomyia* pattern (Fig. 59). *Head* densely dusted silver-grey

with fuscous-black interfrontalia, these are more than thrice as wide at middle as a parafrontale; eyes bare, separated by a seventh head-width near middle of frons, the latter slightly widened above, moderately widened below, parafrontalia narrow, with about 6 rather strong inclinate setae and some interspersed small ones, otherwise bare; frons and mouth-margin not produced, parafacialia not much narrower than, jowls thrice as wide as, third antennal segment. Basal antennal segments brownish, third pale yellowish, slightly broadened near apex, about six times as long as wide near apex, arista long and long-plumose, most rays more than twice as long as width of antenna. Palpi fuscous. *Thorax* dusted whitish-grey, in front of suture with a pair of narrow paramedian vittae and a suffused fuscous spot, contiguous with the vitta, from neck to second *prst dc*, behind suture with a broad complete transverse band, which exceeds the second *post dc* and the *ia* posteriorly, scutellum wholly dark; second *prst dc* at middle of *prst* part, *post dc* evenly spaced, *acr* not very strong, well behind level of last *dc*. Pleurae with a broad fuscous band from shoulders over anterior half of mesopleura and sternopleura and with a large dark area below the wings, on posterior part of pteropleura, region of the spiracle and the whole of the hypopleura; the 3 *stpl* strong,

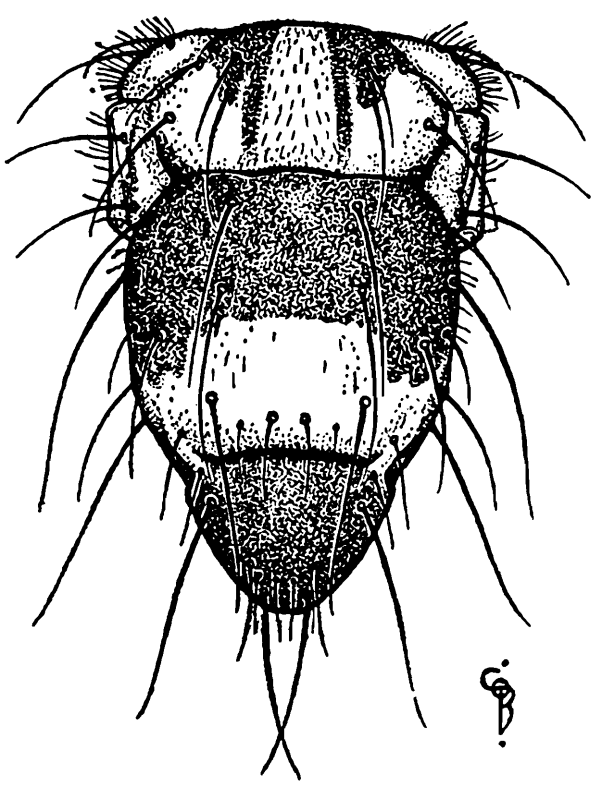


FIG. 59. *Pictia xanthoceras* (Walk.), thorax of male type.

arranged in a triangle which has an obtuse angle of *c.* 120° at the lower *stpl*, distance between lower and posterior setae somewhat shorter than that between lower and anterior ones. *Abdomen* fuscous with dense whitish-grey and, on the dark parts, thin brown dust, first segment pale dusted but for the base and a narrow median vitta, intermediate segments dark on posterior two-thirds, this colouration extending to fore margin on a pointed median vitta, fourth segment wholly dark in dorsal view; in a more posterior view the pale colouration on the intermediate segments extends to middle and the fourth appears largely pale dusted with a long dark wedge-shaped median vitta. *Wings* subhyaline with a brownish tinge, veins testaceous, membrane evenly haired. *Legs* very slender, tarsi much longer than tibiae, with long claws and pulvilli; fore tibia without a *p* but with a small *ad* seta at middle; mid tibia with two *p* setae; *av* setae of hind femur small and decumbent except for 3 near apex, *pv* surface with a short but strong seta at apical third or fourth, hind tibia, in addition to the *pd* seta, with an *ad* at middle and 2–4 fine *av* on third fourth. ♀ unknown.

Length.—8–9 mm., of wings 9 mm.

Distribution.—CELEBES: Macassar. LUZON. SUMATRA. MALAYA.

The type with the labels 'Mac' and '*xanthoceras*' is a male and not, as stated by Walker, a female.

Genus 21. **Buccophaonia** gen. n.

Head (Fig. 60) with the vibrissal angles and mouth-margin somewhat produced; eyes of male more or less contiguous, of female moderately widely separated; male without inner and outer verticals, with a pair of strong diverging postocellars, and with one pair of reclinate frontal setae below level of anterior ocellus; female with one pair below and one above that level and without cruciate interfrontal or proclinate orbital setae. Arista plumose. *Thorax* with *prst* and *post acr*, 2+4 *dc*, 2 *ia*, a short but conspicuous *pra* and the other dorsal setae in normal arrangement; prosternum setulose at margins, propleural depression and pteropleura bare; propleural, prostigmal and anterior mesopleural well developed, 1+2 *stpl*, supraspiracular convexity and lower posterior part of hypopleura (above hind coxa) with small erect black hairs; metathoracic spiracles with a few black setulae on posterior part of lower margin; hair of scutellum extending to lower edge. *Abdomen* shortly ovate to cordate with stronger setae only laterally and apically.

Wings with the *sc* very strongly sinuous, r_{4+5} and *m* somewhat converging at apex, *r-m* well beyond middle of discal cell, sixth vein incomplete and seventh unusually straight, thus diverging from sixth up to apex; posterior surface of stem-vein with about 5 small setulae, dorsal and ventral surfaces of r_1 bare, node and base of r_{4+5} with some setulae on dorsal and ventral surfaces. Calyptrae well developed, lower one strongly projecting, of *Phaonia* type. *Legs* not very long; mid femur without an *a* pre-apical, mid tibia with only *p* and *pd* submedian setae; *pd* seta of hind tibia not much beyond middle, *pv* apical seta absent.

Genotype: *B. subcostalis* sp. n.

Although the key characters are close to those of *Pictia*, the general appearance of the only species is that of a *Mydaea*. The characters are somewhat reminiscent of *Graneria* Curr., but in the latter the prosternum is bare and the pteropleura setulose, moreover r_{4+5} is much more extensively setulose. The strongly sinuous *sc* and the setulose stem-vein are somewhat unusual characters.

84. **Buccophaonia subcostalis** sp. n.

(Fig. 60)

♂ ♀: Testaceous with brown interfrontalia, suffusedly browned disc of mesonotum, and slightly browned abdomen, with moderately dense pale yellowish-grey, on dorsum more greyish-brown, dust. *Head* with large bare eyes, frons and mouth-margin produced by width of antenna; eyes probably subcontiguous in male (head of male type shrunken), male with weak ocellars and a continuous row of about 12 inclinate setae between reclinate seta and lunula; female frons about $\frac{3}{10}$ (0·28–0·33) head-width at vertex, narrowed in an almost straight line to anterior fifth where it is $\frac{1}{4}$–$\frac{3}{10}$ head-width, postocellars, inner and outer verticals and ocellars strong, frontal triangle elongate, exceeding middle of frons, darker brown and somewhat shining, interfrontalia at middle 3–4 times width of a parafrontale, the latter with about 9 inclinate setae, the alternating ones small, and, exteriorly, with an irregular row of very small proclinate black hairs; parafacialia below middle a third width of antenna, jowls almost half as wide again as antenna. Arista long-plumose, most of the rays longer than width of antenna but only half erect. Palpi reddish-yellow, rather long. *Thorax* with a pair of narrow undusted vittae between the *acr* and *dc* and broadly interrupted broader vittae between the *dc* and *ia*;

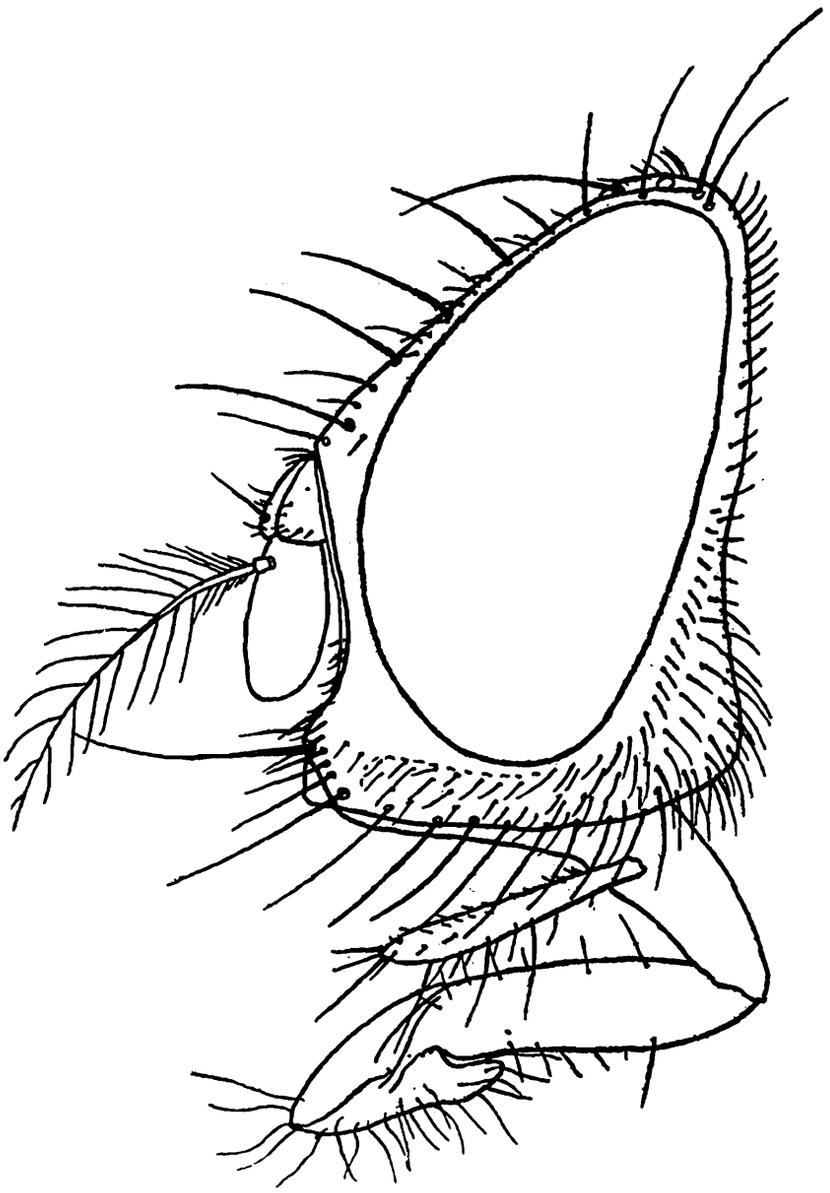


FIG. 60. *Buccophaonia subcostalis* sp. n., head of female.

with 2+1 *acr*, the second *prst* pair at suture, anterior two *post dc* weaker, anterior *ia* about halfway between levels of first and second *post dc*; scutellum subtriangular, rather long and somewhat flattened on disc. *Abdomen* without a distinct pattern, with three pairs of strong discal setae, which are broadly separated at middle, on dorsal surface of fourth segment, and with a row of strong marginals on the same segment, the lateral marginals distinct also on the third segment, especially in male. *Wings* subhyaline with a slight brownish tinge, membrane evenly haired; apex of r_1 slightly beyond level of *r-m*, apical sector of *m* up to about twice length of last but one. Calyptrae brownish-testaceous, subopaque, with brown border and fringe. Halteres dull yellowish. *Legs* testaceous with browned femora; fore tibia

without submedian setae; mid femur with an irregular row of *a* setulae from base to middle, which becomes more regular distally, ending in 2–3 short but strong setae, and with about 6 erect and pointed, but not very long, *av* setae from base to middle, mid tibia with a *p* seta at middle and a *pd* at apical fourth; hind femur with 2–3 long and strong *av* pre-apicals, hind tibia with, in addition to the *pd*, an *ad* and *av* seta near middle.

Length.—4·9–5·9 mm., of wings 4·7–6·2 mm.

Distribution.—MALAYA: Kuala Selangor, 25.VIII.34 (*G. H. Corbett*), ♂ type, 4 ♀ paratypes; *ibid.*, 27.XI.30, 1 ♀ paratype; all from male flowers of *Nipa fruticosa*; *ibid.*, 26.IX.37, 1 ♂ paratype, from female flower of *N. fruticosa* (all in B.M.).

Genus 22. **Muscina** Robineau-Desvoidy.

1830. *Muscina* R.-D., *Myod.*, 406. Genotype: *Musca stabulans* Fln.

Head short and broad with large bare eyes, which are subcontiguous in male and broadly separated in female; postocellars and inner and outer verticals small but distinct in male, rather strong in female, ocellars moderately strong in male, strong in female; male without, female with, two small reclinate setae, inclinate frontal setae almost reaching level of anterior ocellus; female with cruciate interfrontal setae. Arista plumose with the apical fourth bare. *Thorax* stout with 3+1(–3) *acr*, 2(3)+4 *dc*, 2 *ia*, a well-developed but not very long *pra*, the other dorsal setae as usual; prosternum, propleural depression and pteropleura bare, hypopleura with a few black hairs above hind coxa; auxiliary prostigmal and anterior mesopleural well developed, 1+2 *stpl*, the posterior two rather close together, but the lower well below the posterior one. Metathoracic spiracle large and dark but without black hairs. Hair of scutellum extending over lateral surface and normally reaching ventral edge, ventral surface bare. *Abdomen* short-ovate or subcordate, with strongish setae only at sides and on fourth segment, the latter truncate, more broadly so in male. *Wings* without setulae on veins (except costa) and subcostal sclerite; *sc* strongly sinuous, *r-m* well beyond middle of discal cell, r_{4+5} and *m* converging, *m* being broadly but considerably upcurved and slightly sinuous at apex. Lower calyptra strongly projecting, of *Phaonia* type. *Legs* moderately slender, fore tibia with some *ad* setulae (stronger in female) but without *p* setae; mid femur with an *a*, *av* and *pv* row of strong but

not very long setae, and without an *a* pre-apical, mid tibia with some *p* setae, but without other submedian setae; hind femur with *av* setae on the whole length, a few near apex being stronger, and in male with *pv* setae on basal half, hind tibia with a *pd* seta towards apical third, a well-developed *ad* and *d* pre-apical, and with some *av* and *ad* setae.

Only one species, which is recognized by its pale tibiae and somewhat less narrow frons in the male, has been found in the region.

Biology.—The adult is sometimes found in houses, more often in the open on decaying organic matter, on which the eggs are deposited. The latter have a pair of longitudinal flanges and are very similar to those of *Phaonia*. The newly-hatched larvae are in the first instar and remain saprophagous in this and the second; at the end of the latter and during the third they become carnivorous but remain able to complete their transformation on decaying matter. They are found in decaying fleshy parts of plants, especially fruits, and fungi, in carrion, old cheese, but apparently seldom in excrements. They prey especially on maggots of other Diptera but have also been bred as 'parasites' of many other insects, *e.g.* Lepidoptera (*Agrotis*, *Heliothis*, *Panolis*, *Laphygma*, *Dendrolimus*, *Lymantria*, etc.), Coleoptera (*Melolontha*, *Polyphylla*, *Pissodes*, etc.) and Orthoptera (*Nomadacris* and *Schistocerca*). Sometimes parasitization of pests by *Muscina stabulans* can assume important proportions. The larvae are also found in birds' nests and can cause cutaneous and intestinal myiasis in higher animals, including man. Before pupating, which normally takes place in the soil, the larva forms a cocoon of earth or other foreign material available at the place of pupation. In normal temperatures the egg stage lasts from 1½ to a few days, the larval stage about a week and the pupal stage normally about three weeks. The best description of the third-stage larva was published by Zimin (1948, *Opred. Faune SSSR.*, XXVIII, 66, Fig. 36 A–H).

85. **Muscina stabulans** (Fallén).

1817. *Musca stabulans* Fln., *K. Vet. Acad. Handl.*, 1816 (2), 252. Type: Sweden. Mus. Stockholm.

Fuscous-black with pale testaceous tibiae and at least extreme tips of femora; rather densely dusted pale grey with a darker pattern. *Head* dusted silver-grey with shifting reflections; eyes separated in male by width of third antennal segment, in female at vertex by over a third head-width;

interfrontalia fuscous-black or dark brown, wider than a parafrontale above and widening anteriorly in male, fully thrice as wide in middle as a parafrontale in female; parafrontalia in female with many small proclinate black setulae outside the frontal series; parafacialia somewhat narrower than, jowls about twice as wide as, third antennal segment; vibrissae inserted very slightly above mouth-margin with numerous decumbent setulae close above them. Palpi orange; antennae fuscous, second and base of third segment reddish, third segment two to two-and-a-half times as long as second; arista plumose with a moderate number of rays, most of which are longer than third antennal segment. *Thorax* black with whitish-grey dust and four moderately narrow dark vittae, the inner ones slightly exceeding second *post dc* behind, the outer ones incomplete and broadly interrupted at suture; anterior *ia* between levels of *sa* and second *post dc*. *Abdomen* thickly covered with grey dust with a somewhat shifting pattern; in posterior view largely and densely grey dusted with a median vitta consisting of elongate wedge-shaped fuscous spots, the broader end of which lies at the bases of the segments; in addition especially an irregular transverse spot as a rule present on lateral part of base of segments, dorsum of fourth segment with numerous irregularly arranged setae; hypopygium inconspicuous. *Wings* subhyaline with evenly haired membrane and brown veins; fourth vein bent forward, so that R_5 is narrowed to about three-fifths of its greatest width; basicosta yellowish-orange. Calyptrae greyish-white, subopaque, with whitish border and fringe. Halteres dull reddish-yellow. *Legs* fuscous, femora thinly grey-dusted, fore femur orange at tip, posterior ones more broadly (♂) or largely to wholly (♀) orange, tibiae orange, tarsi fuscous; hind tibia with the *pd* seta small, in addition with 2 *av* and 2 *ad* setae, the *ad* forming part of a row of smaller or indistinct setulae.

Length.—6–8·5 mm., of wing 5·5–8 mm.

Distribution.—Abundant in temperate regions, also occurring in the NEARCTIC and NEOTROPICAL REGIONS, various parts of the ETHIOPIAN REGION and FIJI. I have seen specimens from S. INDIA and KASHMIR.

Genus 23. **Phaonia** Robineau-Desvoidy.

1830. *Phaonia* R.-D., *Myod.*, 482. Genotype: *Musca* (*viarum* R.-D. =) *erratica* Fln.

Head with the eyes bare or hairy, more or less narrowly separated to contiguous in male, broadly separated in female;

frons even in female without proclinate orbital setae, very seldom (*interfrontalis*) with cruciate interfrontal setae in female, in this sex always with two reclinate upper frontal setae, the anterior of which is never stronger than the second; jowls without conspicuous upcurved setae; arista short-plumose to long-plumose, the longest hairs more than half as long as width of third antennal segment. *Thorax* (Fig. 3, p. 4) without or with distinct *prst acr* setae, in Oriental species always 3–4 conspicuous *post dc*; scutellum bare on underside and lower part of lateral surface; prosternum, propleural depression and pteropleura bare; 1+2 *stpl*. *Abdomen* more or less short and stout. *Wings* without setulae on the veins except costa and, in a few species, base of r_{4+5}; *sc* markedly sinuate beyond *h* and strongly bent forwards near apex, *m* not or hardly upcurved at apex, sixth vein not reaching margin and seventh only slightly curved. Lower calyptra well developed, its inner margin diverging from side margin of scutellum from base to apex; projecting beyond upper one. *Legs* without conspicuous secondary sexual characters; hind coxa bare on posterior surface; fore femora without pre-apical teeth or excisions; mid femur with an *a* pre-apical, mid tibia without *av* or *ad* submedian setae; hind tibia with a strong *pd* seta between middle and apex.

Distribution.—All zoogeographical regions.

Biology.—The following is a short account of the biology of Palaearctic species, nothing being known about that of the Oriental forms. Adults on flowers, foliage, often in humid places, sometimes on excrements. Eggs provided with a pair of flanges on ventral surface; deposited on or near the medium in which the larvae live, e.g. fungi, wounds of trees, in damp or rotting wood, under moist bark, etc. The larvae are probably always associated with fungus growth and certainly with other insects, especially maggots of Diptera, which they devour (Keilin, 1917, *Parasitol*., **IX**, 362; Thomson, 1937, *Idem*, **XXIX**, 321). The newly hatched larva is often, or perhaps usually, the third instar (described by Thomson, 1937, 324, Figs. 122–128).

Key to the Species of Phaonia.

1 (6) *pra* much smaller than the second *npl* or absent. 3 *post dc*. *prst acr* weak or absent. Abdomen and palpi fuscous. Notopleura bare except for the 2 *npl*.

2 (5) Legs, infra-alar bulla and thoracic spiracles fuscous. Halteres more or less infuscate. Thorax and

abdomen wholly fuscous-black or piceous-black. *acr* hairs rather long and some of the outer ones more or less distinctly stronger.

3 (4) Base of r_{4+5} with a few small setulae on underside. Fore tibia without a submedian seta (normally). *pra* absent; *prsc* very fine. Ocelli arranged at the angles of an equilateral triangle. R_5 rather narrow, sector of *c* between r_{4+5} and *m* much shorter than that between r_{2+3} and r_{4+5} (Fig. 61). ♂: Eyes densely hairy; ♀: Eyes with sparse short hairs..... *atronitens* Mall., p. 228

4 (3) Base of r_{4+5} bare. Fore tibia with a submedian seta. *pra* small but very distinct; *prsc* moderately strong. Anterior ocellus more distant from the posterior ones than these from each other. R_5 rather wide, sector of *c* between r_{4+5} and *m* only a little shorter than that between r_{2+3} and r_{4+5} (Fig. 62). ..... *proocellata* sp. n., p. 229

5 (2) Legs (except tarsi) and infra-alar bulla pale testaceous, thoracic spiracles pale golden-brown. Halteres yellowish. Lateral part of mesonotum, scutellum and pleurae in female conspicuously translucent pale ferruginous, in male fuscous.

6 (1) *pra* longer than the second *npl*, seldom equal or slightly shorter, in these cases 4 strong *post dc* or strong *prst acr* present; or abdomen wholly testaceous.

7 (54) 3 strong *post dc*.

8 (15) Head conspicuously longer at vibrissal angle than at lunula (Figs. 63, 65); mouth-margin distinctly produced between vibrissae. Eyes distinctly hairy. Shoulders and infra-alar bulla fuscous. Without *prst acr* or with one strong pair. Auxiliary prostigmal indistinct. If the legs are pale, the fore tibia with a *p* seta.

9 (10) Legs fuscous-black with only the knees and extreme base of the femora narrowly pale ferruginous, fore tibia without a *p* seta (♂). Longest rays of arista fully as long as width of third antennal segment. Parafacialia as wide as third antennal segment. Tarsi

with the normal rows of setulae. Notopleura hairy (♂).. ... . *thomsoni* Mall., p. 232

10 (9) Femora and tibiae wholly pale testaceous, fore tibia with a *p* seta near middle. Longest rays of arista about two-thirds width of third antennal segment. ♀ : Without *prst acr*.

11 (12) Trochanters pale testaceous. Notopleura bare except for the 2 *npl.* ♂ : Eyes contiguous and sparsely short-haired; tarsi everywhere covered with the normal setulose hairs (Fig. 65); with a pair of strong *prst acr*. ♀ : Mouth-margin more produced and lying slightly below level of vibrissae, especially laterally, where it is freely exposed (Fig. 63).. .. .. *oxystoma* sp. n., p. 233

12 (11) Trochanters almost always browned. ♂ : Eyes subcontiguous, separated by $\frac{1}{3}$–$\frac{1}{2}$ greatest width of third antennal segment, densely long-haired; *ad* (and on fore tarsus *pd*) surfaces of tarsi (except the distal segments) largely devoid of the normal short stiff hairs and covered instead with microscopic pile (Fig. 66). ♀ : Mouth-margin somewhat less produced, lying at level of vibrissae, covered laterally by anterior margins of jowls (Fig. 64).

13 (14) ♂ : A pair of long and strong *prst acr* present; notopleura bare, except for the 2 *npl.* Dust of dorsal surface more conspicuous, abdominal segments with distinct dark hind margins in posterior view. ♀ : *prst acr* hairs at middle of *prst* part arranged in 4–5 irregular transverse rows. ... *kambaitiana* sp. n., p. 236

14 (13) ♂ : No trace of *prst acr* setae; notopleura hairy. Dust of dorsal surface very thin, abdomen with only an indistinct suffused dark median vitta, without dark hind margins. ♀ : *prst acr* hairs at middle of *prst* part arranged in 5–6 irregular rows. .. .. *oxystomodes* sp. n., p. 237

15 (8) Head not longer at vibrissal angles than at lunula (Fig. 70); mouth-margin not markedly produced between vibrissae; if slightly produced (*cilitibia*) the fore tibia without a *p* seta *and* the legs at most somewhat browned,

16 (21) At least one pair of conspicuous *prst acr* setae. Notopleura bare except for the 2 *npl.* Abdomen wholly dark in ground-colour.

17 (18) Only one pair of *prst acr*, these are strong and lie between levels of anterior and posterior *prst dc.* *pra* much stronger than second *npl.* Legs pale with dark tarsi. Auxiliary (more dorsal) prostigmal only slightly weaker than the main prostigmal. Scutellum translucent testaceous. Two pairs of long *post acr* in front of scutellum..... *heteromma* sp. n., p. 238

18 (17) 2–3 pairs of *prst acr*, the last and strongest level with or slightly behind the posterior *prst dc.*

19 (20) Fore tibia with a *p* submedian seta; fore femur largely infuscate; all coxae fuscous, hind femur (♂) infuscate near apex. Longest hairs of arista only slightly longer than width of third antennal segment. *acrostichalis* sp. n., p. 240

20 (19) Fore tibia without a *p* submedian seta; all femora wholly testaceous. Longest hairs of arista about half as long again as width of third antennal segment. ... . *latecostata* sp. n., p. 241

21 (16) Without distinct *prst acr* setae, all setulae being hair-like (in *rubriventris*, with pale orange abdomen, sometimes 1–2 *prst* hairs stronger).

22 (25) Thorax *or* abdomen uniformly pale ferruginous or testaceous. Lower calyptra browned, with brown border. Hind tibia normally with 2 *ad* setae, fore tibia without a submedian seta. Longest rays of arista not or only slightly longer than width of third antennal segment. ♀: Vertex less to slightly more than a quarter head-width.

23 (24) Thorax uniformly pale ferruginous, abdomen fuscous except for first segment. Upper anterior embossed part of hypopleura with rather long pale setulose hairs. Notopleura hairy.. ..... *flavinota* sp. n., p. 242

24 (23) Thorax fuscous; abdomen uniformly pale orange. Hypopleura bare. Notopleura bare except for the 2 *npl.* . .. . *rubriventris* sp. n., p. 243

25 (22) Abdomen and at least disc of mesonotum largely infuscated; if the pleurae largely pale, the vertex of the female well over a third head-width.

26 (27) Upper anterior embossed part of hypopleura with rather long pale setulose hairs. Thorax uniformly cinereous dusted, almost without a trace of vittae; mesonotum fuscous in ground-colour, only laterally towards scutellum somewhat reddish-yellow translucent, scutellum wholly so. Longest rays of arista much longer than width of third antennal segment. Eyes bare. Fore tibia without a submedian *p* seta. ♂: Frons fully as wide as third antennal segment.... *glauca* Mall., p. 245

27 (26) Hypopleura quite bare. Thorax with distinct pale dusted and dark vittae.

28 (29) Base of r_{4+5} with some black setulae on underside. *r-m* and *m-m* strongly suffused. Large species (wing length *c.* 9 mm.). ♀: Proboscis with a large paired labellar appendage (*see* Fig. 71); palpi subcylindrical; parafacialia with a spot of dark reflections above; mid femur with only 1–3 strong *v* setae; fore tibia with 2 (–1) *p* setae. (♂ unknown). ... . *venisetosa* sp. n., p. 246

29 (28) r_{4+5} bare.

30 (31) Hind tibia with an additional *pd* seta at basal fifth. *r-m* and *m-m* slightly suffused. Fore tibia without a *p* seta. ♀: Proboscis with a large paired labellar appendage (Fig. 71); palpi slightly flattened; parafacialia in lateral view appearing largely dark; mid femur with 3–4 strong *v* setae in basal half ... .. . *basichaeta* sp. n., p. 247

31 (30) Hind tibia with only one *pd* seta, the *Phaonia* 'calcar'.

32 (37) Scutellum wholly pale testaceous, at most the base suffusedly browned.

33 (34) Pleurae pale except for a dark suffusion on the pteropleura. Arista long-plumose, only a few rays shorter than width of third antennal segment. *m-m* almost straight and rather steep. Fore tibia without a *p* seta. (♂ unknown). .... *xanthopleura* sp. n., p. 250

34 (33) Pleurae extensively infuscated. Arista plumose, few if any of the rays as long as width of third antennal segment.

35 (36) *m-m* rather straight; anterior distal angle of discal cell not very sharp

(Fig. 72). Fore tibia without a *p* seta. ... . *rectinervis* sp. n., p. 251

36 (35) *m-m* concave; anterior distal angle of discal cell sharp (Fig. 73). Fore tibia with 1–2 *p* setae. ... ... *flavomaculata* Mall., p. 253

37 (32) Scutellum fuscous, at most the smaller apical half with a testaceous margin.

38 (41) Fore tibia with 2 *p* setae. Halteres pale yellow. Auxiliary prostigmal hair-like. Anterior thoracic spiracle infuscated. Arista long-plumose. ♂: Eyes narrowly separated, interfrontalia complete; cross-veins suffused, rather steep and more or less straight. ♀: Proboscis with a conspicuous paired labellar appendage (*see* Fig. 71).

39 (40) Longest rays of arista somewhat longer than width of third antennal segment. Fore femora and tips of posterior femora infuscated. Wing length about 5·5 mm.. *apicefemoralis* sp. n., p. 254

40 (39) Longest rays of arista half as long again as width of third antennal segment. Femora almost wholly pale. Wing length 6·3–8·4 mm.... *freyana* sp. n., p. 256

41 (38) Fore tibia with 0–1 *p* seta, in some females with 2 *p* setae, but then the halteres infuscated. If *m-m* is suffused, it is conspicuously oblique and concave, so that the anterior apical angle of the discal cell becomes sharper than in the preceding species. Third antennal segment wholly fuscous.*

42 (45) Rays of both under and upper side of arista conspicuously longer than width of third antennal segment. Fore tibia without a *p* seta. *m-m* not infuscated, slightly oblique and concave. Thoracic vittae very conspicuous. ♂: Eyes subcontiguous.

43 (44) Palpi fully as long as third antennal segment. Coxae wholly pale testaceous. Eyes sparsely short-haired, hairs hardly as long as diameter of an ocellus..... .... *malaiseana* sp. n., p. 257

44 (43) Palpi as long as the part of the third antennal segment situated distad

---

* Third antennal segment (♂) testaceous with brownish apical half; arista 'long-plumose'. A slender largish species somewhat similar to the genus *Megophyra* but with a very strong *pra*: *malayana* Mall.; N. Borneo (not known from Malaya in the usual sense).

to the aristal insertion. Coxae somewhat browned. ♂: Eyes densely long-haired, hairs thrice as long as diameter of an ocellus. (♀ unknown). . ... *longiplumosa* sp. n., p. 258

45 (42) Longest rays of arista not or hardly longer than width of third antennal segment, in the latter case *m-m* conspicuously oblique, the coxae strongly infuscated and the thoracic vittae rather inconspicuous.

46 (51) *m-m* not infuscated and more or less upright; last section of *m* more than twice as long as last but one, if *m-m* is slightly oblique. Scutellum wholly fuscous (but see *macrostemma*).

47 (50) Fore tibia without a *p* seta near middle. Abdomen densely dusted, *m-m* steep and almost straight. Arista fully as broad, including plumosity, as third antennal segment.

48 (49) Outer thoracic vittae running from suture to second *post dc*, broadly fused with the paramedian ones, the pale dusted *dc* vitta thus behind suture reduced to a small triangle from suture to beyond first *post dc* (Fig. 75); scutellum light brown translucent (always ?). ♂: Ocelli separated by less than their smaller diameter, almost contiguous; inner upper facets of eyes conspicuously enlarged; hind tibia without half-erect *p* setulae. *macrostemma* sp. n., p. 259

49 (48) Thoracic vittae parallel, well separated by pale dusted vittae; scutellum fuscous. ♂: Ocelli separated by twice their greater diameter; inner upper facets of eyes only slightly enlarged; hind tibiae at middle of *p* surface with some small half-erect setulose hairs... *cilitibia* sp. n., p. 261

50 (47) Fore tibia with a *p* seta near middle. Abdomen glossy and very thinly dusted. *m-m* slightly oblique and concave. Arista short-plumose, much narrower, including plumosity, than third antennal segment. *breviplumosa* sp. n., p. 262

51 (46) *m-m* often infuscated, always conspicuously oblique and concave or sinuous, the distal anterior angle of the discal cell sharp (Fig. 74). Last section of *m* less than twice as long as last but one. Apex

of scutellum with a testaceous margin. Coxae more or less strongly infuscated. ♀: Palpi conspicuously flattened and broadened.

52 (53) Longest rays of arista shorter than width of third antennal segment. ♂ ♀: Transverse veins not suffused. ♀: *m* almost straight near apex; palpi much narrower than third antennal segment; halteres pale. *longipalpis* sp. n., p. 264

53 (52) Longest rays of arista as long as width of third antennal segment. ♀: Transverse veins and *Sc* more or less distinctly suffused, apical part of *m* very distinctly upcurved, palpi long and broad, fully as wide as third antennal segment (Fig. 76); halteres more or less infuscated *magnipalpis* sp. n., p. 265

54 (7) 4 strong *post dc.* r_{4+5} bare.

55 (60) Upper anterior part of hypopleura with some setulose hairs. Fore tibia without a *p* seta. Halteres pale testaceous. ♂: Eyes with rather dense hair.

56 (59) Longest rays of arista conspicuously longer than width of third antennal segment. Hairs of hypopleura dark and short.

57 (58) Scutellum testaceous. 0+1 *acr.* Abdomen in posterior view with a darker median vitta but otherwise without distinct shifting spots. Parafacialia much narrower than third antennal segment. Femora and tibiae wholly testaceous. Thoracic vittae rather faint in male. .. *simulans* Mall., p. 267

58 (57) Scutellum fuscous. 0+2 *acr.* Abdomen in posterior view with conspicuous shifting spots in addition to a dark median vitta. Parafacialia wider than third antennal segment (♀). Anterior femora fuscous, hind femur somewhat infuscated towards apex. Thoracic vittae conspicuous.. . *kashmirensis* Mall., p. 269

59 (56) Longest rays of arista not longer than width of third antennal segment. Hairs of hypopleura pale golden and rather long. Scutellum fuscous. Abdomen in posterior view with a dark median vitta but without other shifting spots. Parafacialia much narrower than

third antennal segment. Legs, except tarsi, wholly pale testaceous. Thoracic vittae faint. *auricoxa* sp. n., p. 270

60 (55) Hypopleura quite bare (? *coeruleicolor* Stein, with fuscous halteres).

61 (64) Fore tibia with 1–2 submedian *p* setae.

62 (63) Vibrissa markedly above mouth-margin, vibrissal angle somewhat more produced than frons, mouth-margin somewhat projecting below and between vibrissae (as in the European *incana* group); jowls without upcurved setae, more than twice, parafrontalia not quite, as wide as third antennal segment. Mid tibia with 5–6 *p* setae (3 *p* and 2–3 *pd*). Many rays of arista half as long again as width of third antennal segment. Legs, apart from tarsi, wholly pale testaceous. Abdomen evenly thinly dusted. Veins not suffused. . . . *acerba* Stein, p. 271

63 (62) Vibrissa at mouth-margin, vibrissal angle not more produced than frons, mouth-margin not projecting between vibrissae; jowls with some upcurved setae, twice as wide, parafacialia as wide, as third antennal segment. Mid tibia with 3–4 *p* setae. Longest rays of arista only slightly wider than third antennal segment. Fore femur piceous-brown. Abdomen with shifting spots. *r-m* and *m-m* suffused... . *curviseta* sp. n., p. 273

64 (61) Fore tibia without a submedian *p* seta, mid tibia with 2–3 setae.

65 (68) With conspicuous *prst* and *post acr* in addition to the *prsc*. Femora, tarsi and palpi piceous or fuscous. Cross-veins suffused. Parafacialia narrower than third antennal segment.

66 (67) 2+3 strong *acr*, the posterior *prst* one anterior to level of the last *prst dc*. Auxiliary prostigmal strong. Notopleura with some hairs on posterior half in addition to the two *npl*. 4 humerals. Apex of scutellum pale ferruginous except for the area between the apical setae; dark vittae of mesonotum moderately broad. ♂: A few of the longest rays of the arista slightly longer than width of third antennal segment. ♀: Longest rays of arista

markedly shorter than width; frons with small cruciate interfrontals; frontal triangle conspicuous, densely dusted grey.. *interfrontalis* sp. n., p. 275

67 (66) About 3+4 moderately strong *acr*, the posterior (and strongest) *prst* one slightly behind level of last *prst dc*. Auxiliary prostigmal absent. Notopleura without hairs. 2 humerals. Apex of scutellum concolorous with the fuscous thorax; dark vittae of mesonotum rather narrow. ♀ : Longest rays of arista somewhat longer than width of third antennal segment; frons without cruciate interfrontals; frontal triangle hardly defined... *atkinsoni* sp. n., p. 276

68 (65) *acr* not differentiated, except for the *prsc*. Legs almost wholly or wholly pale testaceous. Wing without suffusions (in *coeruleicolor* wholly dark).

69 (70) Halteres fuscous. Wings and calyptrae strongly infuscated. Thorax and abdomen black (bluish-black ?) with thin bluish-grey pollinosity, the former with linear faint paramedian vittae. . . . *coeruleicolor* Stein, p. 277

70 (69) Halteres yellowish. Wings and calyptrae not infuscated.

71 (72) Anterior thoracic spiracle fuscous. Coxae strongly infuscated. Longest aristal rays slightly longer than width of third antennal segment. Abdomen with a distinct undusted median vitta. .. .. *fuscicoxa* sp. n., p. 278

72 (71) Anterior thoracic spiracle pale yellow.

73 (74) Abdomen densely and uniformly dusted brown-grey, median vitta absent or only faintly indicated. Longest rays of arista about as long as width of third antennal segment. Wings markedly ochraceous, very conspicuously so at base. Coxae pale testaceous. . . *debilis* Stein, p. 279

74 (73) Abdomen thinly dusted whitish-grey with shifting reflections and with a distinct median vitta. Longest aristal rays slightly longer than width of third antennal segment, rays not very closely placed. Wings hardly ochraceous.

75 (76) Palpi dull orange with infuscated tip. Coxae largely browned or fuscous, pale dusted. ♂ : Mid

femur with a complete row of *pv* setae, which become gradually weaker from base to apex... *seriesetosa* sp. n., p. 280

76 (75) Palpi fuscous. Coxae wholly pale testaceous. ♂: Mid femur with strong erect setae on basal half and with decumbent setulose *av* and *pv* hairs on apical half.. *triseriata* sp. n., p. 282

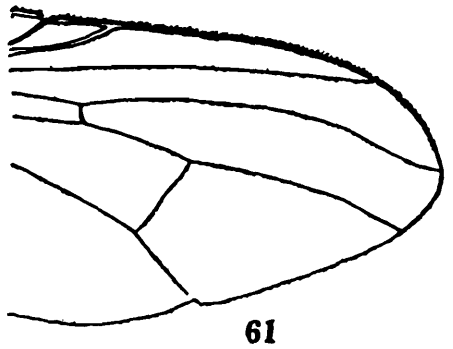
86. **Phaonia atronitens** Malloch.

(Fig. 61)

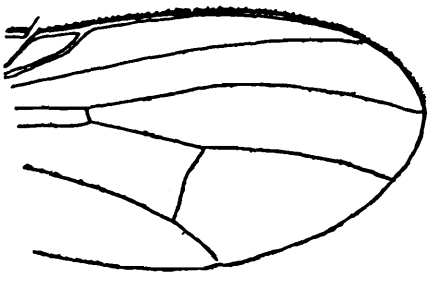
1921. ! *Phaonia atronitens* Mall., *Ann. Mag. n. H.* (9), **VIII**, 235 (♂ ♀). Type: Gulmarg. B.M.

Fuscous-black with thin whitish-grey dust and inconspicuous undusted dark vittae. *Head* with rather dense grey dust, which becomes silver-white on parafacialia and parafrontalia, but which appears dark grey in certain directions; eyes in male densely long-haired, in female inconspicuously short-haired, in male separated by $\frac{1}{10}$–$\frac{1}{9}$ head-width, interfrontalia velvety-black, everywhere conspicuous, and wider than parafrontalia, the latter with 7–8 pairs of inclinate setae, which approach anterior ocellus, ocellars and inner and outer verticals long, fine and distinct but not differing from the adjacent setae and hairs, the innermost one or two occipital setulae similar, the others suddenly only about a quarter length; in female vertex over a third head-width and frons somewhat broadening to lunula, interfrontalia thrice width of a parafrontale at middle, frontal triangle narrow, somewhat shining, slightly exceeding middle of frons, ocellars and verticals strong, parafrontalia with 3–4 pairs of strong inclinate setae, which alternate with hairs; jowls as wide as third antennal segment; vibrissae level with lower eye margins; antennae almost reaching this level; arista somewhat wider in basal half, including plumosity, than third antennal segment, longest hairs slightly shorter than width of that segment. *Thorax* with four moderately broad undusted darker vittae and rather long erect hair, *acr* indistinct, even the *prsc* not very distinct, 2+3 strong *dc*, 2 strong *post ia*, *pra* absent; anterior mesopleural distinct. *Abdomen* in posterior view rather conspicuously dusted pale grey, with a narrow black median vitta, hair of male erect at base, sides and apex, the lateral surface with conspicuous marginals, on the posterior segments a conspicuous marginal and a less conspicuous discal row; fourth ventrite large, somewhat prominent, its hind margin with a deep and broad rounded excision. *Wings* subhyaline,

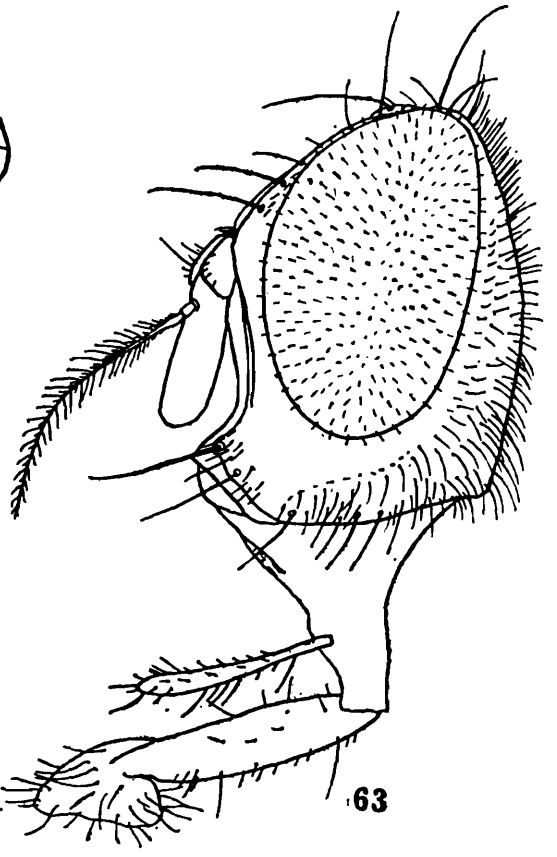
slightly brownish, with a few black setulae on underside of base of r_{4+5}, apices of r_{4+5} and m slightly diverging (Fig. 61); costal spine indistinct. Calyptrae whitish, sub-opaque, with whitish border and fringe. Halteres fuscous. *Legs* piceous-brown; mid tibia with 2–3 *pv* setae; hind femur with long *av* setae on entire length and in male 3–4 fine long *pv* near middle, hind tibia with 2 strong *ad* (at middle and towards apical fourth) and with 3–4 *av* setae.



61



62



63

FIG. 61. *Phaonia atronitens* Mall., apical part of wing.
FIG. 62. *Phaonia proocellata* sp. n., apical part of wing.
FIG. 63. *Phaonia oxystoma* sp. n., head of female.

Length.—5·1–6·3 mm., of wings 5·4–6·1 mm.
Distribution.—INDIA: Kashmir: Gulmarg, 8,500 ft.
Whilst in 3 ♂ and 1 ♀ of the typical series in the B.M. the fore tibiae are without submedian seta, the fourth male has a conspicuous seta on one side and none on the other.

87. **Phaonia proocellata** sp. n.

(Fig. 62)

♀: Fuscous brassy-black with grey dust and three, behind suture four, undusted dark vittae. *Head* moderately densely

dusted grey with more densely dusted frontal triangle, parafrontalia, parafacialia and jowls and a shifting dark spot on upper part of parafacialia; interfrontalia fuscous-black, at middle almost four times as wide as a parafrontale, the latter with four strong (and between the first and second an additional small) inclinate setae; frontal triangle reaching anterior third of frons, its anterior half slightly shining, appearing shagreened and not very well defined, its posterior half densely dusted and strongly convex, anterior ocellus somewhat more widely separated from the posterior ones than these from each other, ocellars very strong (pores larger than those of frontal setae); vertex fully one-third head-width, inner and outer verticals strong, frons considerably dilated to lunula where it is 0·45 head-width. (Antennae of type missing); face somewhat receding; vibrissal angles slightly produced, but not reaching level of lunula. Palpi fuscous, rather broad. *Thorax* rather densely dusted brownish-grey with three broad almost undusted vittae; the dust thus present in posterior view on the shoulder region, a narrow *dc* vitta, a transverse line on anterior side of suture, and a narrow median vitta from suture to the dusted sloping part in front of scutellum; *acr* rather weak, more or less hair-like, in about four irregular rows, the outer ones somewhat stronger, behind suture a few hairs in another row on each side, *prsc* rather weak, 2+3 strong *dc*, 2 rather strong *ia*, the anterior one half-way between levels of *sa* and first *post dc*; *pra* short and rather fine; auxiliary prostigmal inconspicuous, anterior mesopleural distinct, hypopleura bare; scutellum with rather sparse hairs, which do not pass level of setae. *Abdomen* moderately and rather unevenly dusted, in posterior view with ill-defined shifting spots, and, on second segment, with a suffused dark median vitta; third segment with a conspicuous marginal row, fourth with a conspicuous discal and a weaker marginal row. *Wings* somewhat subopaque with a greyish-brown tinge, veins bare, membrane evenly haired, costal spine strong; r_{4+5} very slightly upcurved at extreme tip, thus just noticeably diverging from *m*, which is very slightly and evenly curved backwards (Fig. 62). Calyptrae whitish-yellow with broadly suffused ochraceous borders and pale golden fringe. Halteres fuscous. *Legs* piceous, fore tibia with a small *p* seta at middle (in type only pore left); mid femur with an *ad* pre-apical, some *a* (almost *ad*) setae from base to almost middle, the last of them rather strong, and with 1–2 *pv* near base, mid tibia with 2 *p* setae; hind femur with a complete *av* row of rather

strong setae and 2–3 strong *pv* near base, hind tibia with 2 *ad* and 1–2 *av* setae.

Length.—5·7 mm., of wings 5·4 mm.

Distribution.—N.E. BURMA: Kambaiti, 2,000 m., 18.IV.34 (*R. Malaise*), ♀ type (Mus. Stockholm).

88. **Phaonia luteipes** sp. n.

♂ ♀: Fuscous with pale testaceous femora and tibiae, lateral parts of thorax in female more or less pale ferruginous translucent. *Head* rather densely dusted grey, parafacialia and parafrontalia more silvery, especially in male; eyes almost bare, in male subcontiguous at middle, separated by half the width of the antenna, interfrontalia obsolete at middle but conspicuous just above and below middle, triangular above and below, parafrontalia narrow, frontal setae very small, present in 5–7 pairs, which exceed middle and may approach level of anterior ocellus, ocellars strong, verticals indistinct; vertex of female almost three-tenths (0·27–0·29) head-width, interfrontalia fuscous-black, almost four times as wide at middle as a parafrontale, considerably broadened to lunula, frontal triangle reaching middle, slightly shining anteriorly, ocellars and inner and outer verticals strong, parafrontalia of almost even width to the second inclinate seta, rather strongly broadened from this to lunula, with 4 inclinate setae (1–2 of them small) on anterior half. Basal antennal segments dark brown with paler edges, third pale testaceous with brownish apex in male, fuscous with pale base, especially ventrally (posteriorly), in female; arista testaceous at base, long-plumose, most of the rays up to apical fourth as long as width of third antennal segment. Palpi infuscated brown. *Thorax* rather densely dusted pale grey with some brown dust between the inner, and outward of the outer, vittae, the vittae fuscous-brown, very conspicuous, the inner ones narrow in front and twice as wide behind suture, the *dc* and the *acr* hairs thus on conspicuous pale dusted vittae; *acr* hairs in 3–4 rows, slightly more numerous towards scutellum, *prsc* fine but distinct, 2+3 strong *dc*, 2 *ia*, the anterior one between levels of first *post dc* and *sa*, *pra* small but distinct; auxiliary prostigmal indistinct, anterior mesopleural small and sometimes indistinct, 1+2 strong *stpl*, upper anterior part of hypopleura with some fine black hairs; dorsal hair of scutellum reaching at most upper part of lateral surface. *Abdomen* with a complete undusted blackish median vitta, which becomes narrower on each succeeding segment, with the rest of the

anterior third of each segment dusted pale grey and that of the other two-thirds dusted light brown, in male thickly, in female thinly, in the latter sex the dark ground therefore prevailing on more than posterior half of each segment; setae as in *proocellata*. *Wings* subhyaline, slightly ochraceous at base, *m-m* distinctly suffused; veins without setulae, membrane evenly hairy, costal spine small or indistinct; r_{4+5} and *m* somewhat diverging at apex, *m* almost straight and rather upright. Calyptrae yellowish-white with yellowish border and fringe. Halteres yellowish-white. *Legs* slender, pale testaceous with infuscated coxae and tarsi; fore tibia with a strong submedian seta (sometimes two); mid femur with a row of stronger *a* (*ad*) setulae on more than basal half, with two small *a* pre-apicals, and with unusually strong *p* pre-apicals, mid tibia with 2–4 *p* setae; hind femur apart from the *ad* row and the *d*, *pd* and *p* pre-apicals only with 2–3 *av* pre-apicals, of which one is strong, hind tibia with 2 *ad* and 1–2 *av* setae.

Length.—5·2–6·7 mm., of wings 5·3–6·5 mm.

Distribution.—N.E. BURMA: Kambaiti, 2,000 m. (*R. Malaise*), 9.V.34, ♂ type (Mus. Stockholm), 1.V.–4.VI.34, 2 ♂ 6 ♀ paratypes (Mus. Stockholm, Helsinki and B.M.).

89. **Phaonia thomsoni** Mall.

1921. ! *Phaonia thomsoni* Mall., *Ann. Mag. n. H.* (9), **VIII**, 415, ♂ Type: Gulmarg. B.M.

Fuscous-black with the knees narrowly testaceous; pollinosity greyish-white, rather thick, thorax with six conspicuous undusted dark vittae. *Head* densely dusted silver-grey with contiguous long-haired eyes, which are separated by little more than width of anterior ocellus, interfrontalia linear, practically obsolete in the quarter of their length preceding the ocelli, parafrontalia linear in upper half, moderately dilated to lunula, front half fuscous-black mediad of the frontal row, the latter consisting of 5–6 pairs of strong setae on anterior half alternating with long setulose hairs, and continued to anterior ocellus by 4–5 small setulose hairs; ocellars, postocellars, inner and outer verticals and the innermost 1–2 bristles of the occipital row rather long but not very strong, the other hairs on and near ocellar tubercle hardly smaller; vibrissal angles and mouth-margin between them as much projecting as second antennal segment. Antennae fuscous, arista long, longest hairs as long as width of third antennal segment, hairs evenly diminishing in length

from middle to tip. Palpi fuscous, rather long. *Thorax* with four rather broad vittae, the paramedian ones contiguous at posterior side of suture, narrowly separated behind suture, the outer ones narrowly interrupted at suture, the third pair extending from the *prst* over the *pra* and *sa* to the postalar callus; 0+1 *acr*, the *prsc* anterior to level of last *post dc*, 2+3 strong *dc*, 2 strong *ia*, *pra* much longer than second *npl*; anterior thoracic spiracle pale ochraceous, propleural and prostigmal setae with some adjacent setulose hairs, anterior mesopleural indistinct, 1+2 *stpl*, hypopleura with the anterior upper part setulose. *Abdomen* (lost in type, according to Malloch) ovate, with markings as in *P. serva* Fln., ventro-basal scale bare (!), first ventrite hairy. *Wings* greyish hyaline, evenly haired, veins without setulae, r_{4+5} beyond middle of discal cell, *m-m* moderately oblique, slightly sinuous, r_{4+5} slightly sinuous at tip, *m* almost straight. Calyptrae subhyaline, greyish-white with whitish border and fringe. Halteres pale reddish-yellow. *Legs* moderately slender, fore tibia without a *p* seta; mid femur with strong *pv* setae from base to middle and an *a* and 3 *p* to *pd* preapicals, mid tibia with 3 *p* setae (on one side with in addition a small *pd* close to the proximal *p* seta); hind femur with a complete *ad* and *av* row and some long fine *pv* setae on basal two-fifths, hind tibia with the *pd* seta at apical fifth and with 2 *ad* and 3 small *av* setae.

♀ unknown.

Length.—7·5 mm., of wings 6·3 mm.

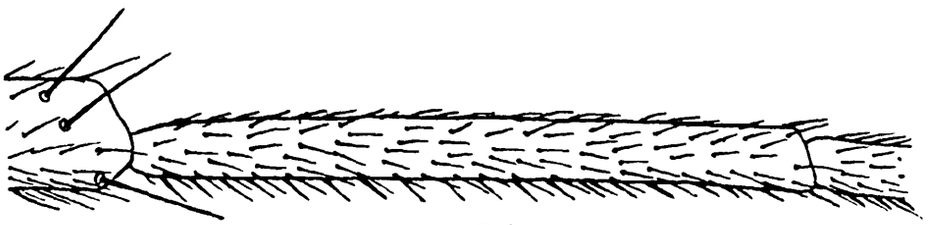
Distribution.—INDIA: Kashmir: Gulmarg, 8,500 ft. (type).

90. **Phaonia oxystoma** sp. n.

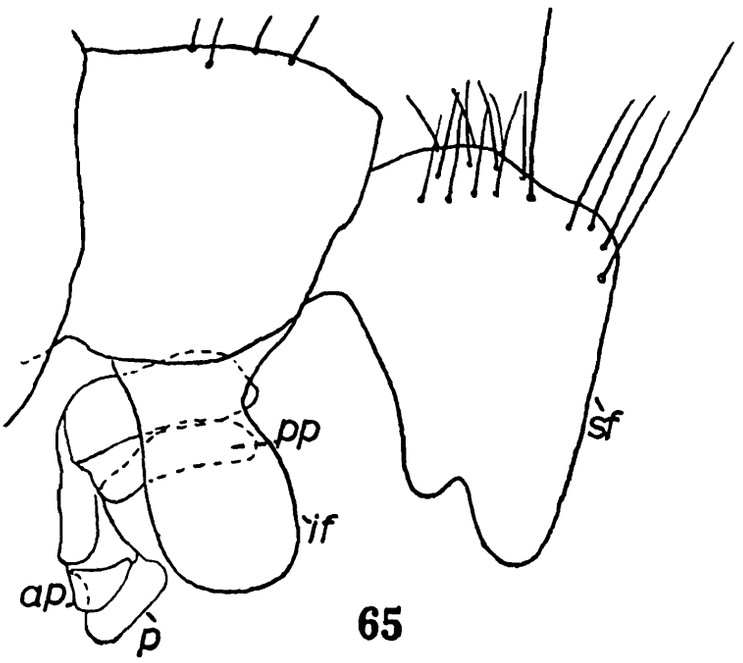
(Figs. 63, 64, 65)

♂ ♀: Fuscous with rather thin pale grey dust, some of the thoracic sutures and margin of scutellum usually pale ferruginous translucent; femora and tibiae pale testaceous. ♂: *Head* rather densely dusted pale grey on anterior surface, parafrontalia with a small shifting dark spot at level of lunula, otherwise like the parafacialia with silver reflections; eyes contiguous with short and sparse but very distinct hair, the hairs being slightly shorter than greatest width of arista (excluding its hairs), interfrontalia obsolete at middle, visible as small fuscous-brown triangles above and below, parafrontalia linear in upper half, gradually broadened to lunula, with 4–5 inclinate setae on less than anterior half and 4–5 setulae from there to end of third fifth; ocellars, postocellars

and verticals long and fine, occipital row and hairs on occiput fine and moderately long; in profile the head is almost one-fifth longer at mouth-margin than at lunula, mouth-margin conspicuously prominent between vibrissae, lying slightly below their level, and being freely visible in front of the upcurved part of the peristomal margin. Third antennal segment twice as long as second, almost reaching vibrissae; arista long, short-plumose, longest hairs somewhat shorter than width of third antennal segment. Palpi and proboscis fuscous, markedly slender and long. *Thorax* thinly dusted grey with slight bluish-pruinose reflections and with four moderately broad undusted vittae, which are conspicuous in posterior view; hair of mesonotum not very dense, arranged in 6–8 irregular rows between the *prst dc*; 1+1 strong and long *acr*, behind level of anterior *prst dc* and round about level of hind *post dc*, 2+3 strong *dc*, 2 strong *ia*, anterior one somewhat behind level of first *post dc*, *pra* and *prst dc* much longer than second *npl*; auxiliary prostigmal



64



65

FIG. 64. *Phaonia oxystoma* sp. n., left hind metatarsus of male.

FIG. 65. *Phaonia oxystoma* sp. n., male genitalia. *ap*, anterior paramere; *if*, inferior forceps; *p*, penis; *pp*, posterior paramere; *sf*, superior forceps.

hair-like, anterior mesopleural usually indistinct, 1+2 strong *stpl*, hypopleura bare, metathoracic spiracle large; scutellum with the margin often suffusedly testaceous translucent, dorsal surface with fine long erect hairs, which do not exceed level of the setae laterally. *Abdomen* subcircular to shortly ovate, fuscous with thin grey dust and some dark brown dust on disc, in posterior view almost evenly grey-dusted with a suffused black median vitta and narrow hind margins, setae as in *heteromma*; hypopygium not prominent, fourth ventrite with pale testaceous inner margins, the lobes separated by a rather broad subtriangular excision, ♂ genitalia (Fig. 65). *Wings* subhyaline, somewhat ochraceous near base, with light brown veins, costal spine absent, r_{4+5} bare, r_{4+5} hardly noticeably sinuous towards apex, the extreme tip very slightly upcurved, *m* virtually straight, *m-m* rather upright. Calyptrae pale ochraceous with concolorous border and fringe. Halteres pale reddish-yellow. *Legs* with pale testaceous femora and tibiae, infuscated coxae, pale testaceous trochanters and piceous tarsi (Fig. 64); fore tibia with a *p* seta at middle; mid femur with the hair on greater basal half of anterior surface rather long and strong, especially those near middle, with a row of *pv* setae on basal half, and an *a*, *p* and *pd* pre-apical, mid tibia with two *p* setae; hind femur with a row of *ad*, *av* and *pv* setae, the latter extending only slightly beyond middle, the other two strongest near apex, and with a *p* and 2 *pd* pre-apicals, hind tibia with a strong *ad* seta at middle and 3–5 rather small *av*.

♀ : Similar to male, but the *prst acr* all hair-like, not easily distinguished from the females of the following two species. The vibrissal angles are somewhat more strongly produced (Fig. 63), the mouth-margin more prominent and situated slightly below level of vibrissae, especially laterally, where the edge of the sclerotized part runs more ventrad and is not covered by the anterior margin of the jowls. The *acr* hairs are less numerous and considerably shorter than the width of the third antennal segment, the anterior mesopleural is usually indistinct. Trochanters pale testaceous.

Length.—4·8–7·0 mm., of wings 5·7–7·4 mm.

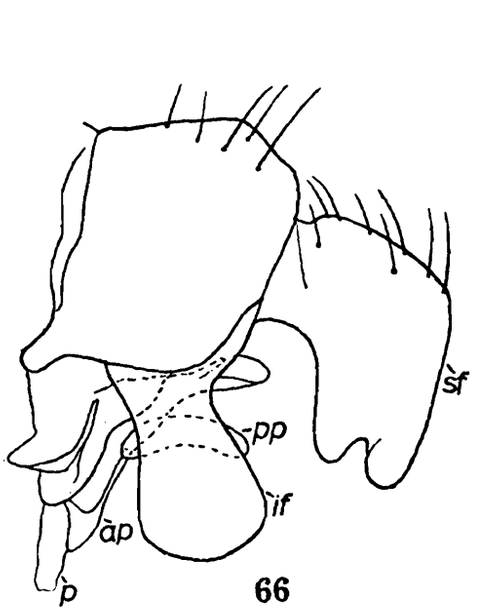
Distribution.—N.E. Burma: Kambaiti, 6.IV.34 (*R. Malaise*), ♂ type, 30.IV.–17.VI.34, 23 ♂ 10 ♀ paratypes (type and paratypes in Mus. Stockholm, paratypes in B.M. and Mus. Helsinki). N. India: Darjeeling, 7,000 ft., 27–29.V.10 (*Brunetti*), 2 ♂ 2 ♀ paratypes (in Zoological Survey of India, Calcutta, and B.M.).

91. **Phaonia kambaitiana** sp. n.

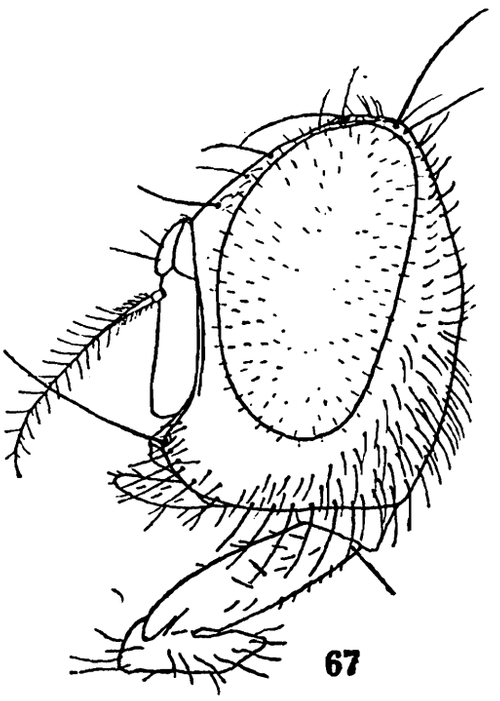
(Fig. 66)

♂ : Exactly fitting description of *P. oxystoma* except for the following characters, in which it tallies with *oxystomodes*. Eyes somewhat more widely separated, the frontal width at narrowest part being not quite $\frac{1}{20}$ head-width, interfrontalia everywhere distinct, slightly less narrow than in *oxystomodes*; eyes densely long-haired. Dust of thorax and abdomen as in *oxystoma*, as are the strong *prst acr*, and hair sparse but hardly shorter than in *oxystomodes*. Trochanters and tarsi as in *oxystomodes*. The genitalia (Fig. 66) also show slight differences, especially in the inferior forceps and anterior parameres.

♀ distinguished from *P. oxystoma* (q.v.) by the somewhat less produced mouth-margin (*see* Fig. 63), and, almost always, by browned trochanters. Not distinguishable with certainty from *P oxystomodes*. In most of the females with browned trochanters the *prst acr* hairs are somewhat denser and stronger (5–6 forming an irregular transverse row at middle of *prst* part), and these females have been placed with the males of *P oxystomodes*. A few females with somewhat finer and sparser *acr* (4–5 forming an irregular transverse row at middle of *prst* part) are more similar in this character and



66



67

FIG. 66. *Phaonia kambaitiana* sp. n. male genitalia. Abbreviations as in Fig. 65.

FIG. 67. *Phaonia oxystomodes* sp. n., head of female.

in the pollinosity of the thorax to *kambaitiana* and have been assumed to be this species.

Distribution.—N.E. BURMA: Kambaiti, 2,000 m., 9.V.34 (*R. Malaise*), ♂ type, 18.IV.–20.V.34, 28 ♂ paratypes, 23.IV.–4.VI.34, 7 ♀ (type, paratypes and females in Mus. Stockholm, paratypes and females in B.M. and Mus. Helsinki). N. INDIA: Mundali, Jaunsa div., Dehra Dun dist., 9,000 ft., V.10 (*Mus. collr.*), ♂ paratype (in Zoological Survey of India, Calcutta); Phagu to Kufri, Simla Hills, 8,000–9,000 ft., 21.V.16 (*Annandale*), 1 ♀ (in Zoological Survey of India, Calcutta).

The differences between the males exclude the possibility of regarding these three forms as variations of one species. As most of the specimens have been trapped in the same few weeks, within a distance of 200 yards (*see* p. 234) they are obviously not geographical forms and will have to be treated as good species.

A male from Kambaiti, 8,000 ft. 8.V.34 (*R. Malaise*) has browned trochanters, no *prst acr*, no hairs on the notopleura, and the *prst acr* arranged in about four irregular rows. It has the distinctive formation of the fore tarsi and the head of this group of species, but the frons occupies almost a quarter of the head-width, and the eyes are short-haired. These characters suggest that it may be an intersex of this or the following species.

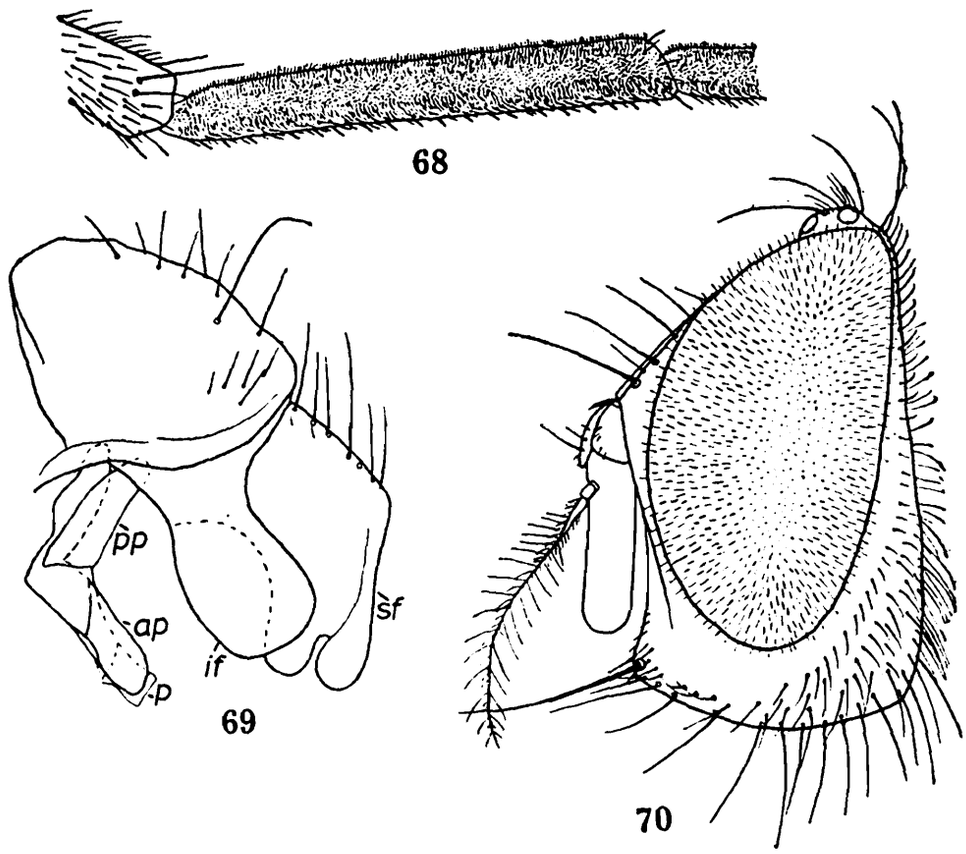
92. **Phaonia oxystomodes** sp. n.

(Figs. 67, 68, 69)

♂ : Exactly fitting the description of *P oxystoma* except for the following details: The eyes are somewhat more widely separated, the frontal width at narrowest part being about $\frac{1}{20}$ (against about $\frac{1}{40}$ in *oxystoma*), interfrontalia everywhere distinct though linear above middle; eyes densely long-haired, the hairs being 2–3 times as long as the greatest thickness of the arista, the dust of thorax and abdomen is even thinner and on the abdomen more evenly distributed, the undusted thoracic vittae therefore less conspicuous, and on the abdomen the undusted median vitta rather indistinct and a darker hind margin usually not traceable on the second segment. The hair on the mesonotum denser, about 10–12 irregular rows being present between the *prst dc* where the hair is about as long as the width of the femora; no trace of *prst acr* setae. Trochanters strongly browned, tarsi (Fig. 68), especially hind ones, slightly thickened, and the regularly arranged *ad* and *pd* rows of setulae of *oxystoma* missing or

traceable only at the tips and replaced by dense fine pile (the tarsi thus somewhat reminiscent of *Mintho*). The male genitalia (Fig. 69) differ slightly from those of the preceding two species.

♀ distinguished from *P oxystoma* (q.v.) by somewhat less produced mouth-margin (Fig. 67) and, normally, by browned trochanters; not clearly distinguished from *kambaitiana* (q.v.).



68

69

70

FIG. 68. *Phaonia oxystomodes* sp. n., left hind metatarsus of male.

FIG. 69. *Phaonia oxystomodes* sp. n., male genitalia. Abbreviations as in Fig. 65.

FIG. 70. *Phaonia heteromma* sp. n., head of male.

Distribution.—N.E. BURMA: Kambaiti, 2,000 m., 23.IV.34 (*R. Malaise*), ♂ type, 8.IV.–11.V.34, 25 ♂ paratypes, 23.IV.–17 VI., 16 ♀ (type, paratypes and females in Mus. Stockholm, paratypes and females in B.M. and Mus. Helsinki).

93. **Phaonia heteromma** sp. n.

(Fig. 70)

♂: Fuscous, moderately thickly dusted pale grey with four undusted vittae, testaceous scutellum and postalar declivity,

and pale testaceous femora and tibiae. *Head* (Fig. 70) fuscous, moderately thickly dusted grey; eyes contiguous or subcontiguous with sparse rather long hairs and strongly enlarged upper inner facets; interfrontalia obsolete or linear at and above middle, triangular on anterior third, parafrontalia linear except in anterior two-fifths, with only two well-developed inclinate setae and 1–2 hairs, verticals indistinct, ocellars small; parafacialia moderately narrow, about a third or fourth width of jowls; vibrissal angle slightly produced but not exceeding frons. Third antennal segment almost reaching mouth-margin; rays of arista of almost even length to near tip, most of them about as long as width of third antennal segment. Palpi dull brown, slightly clubbed. *Thorax* rather densely dusted whitish-grey with four conspicuous fuscous vittae, the inner ones moderately narrow and tending to fuse behind suture, the outer ones broad but not so well defined; 1+2 long *acr*, the *prst acr* anterior to level of second *prst dc*, 2+3 strong *dc*, 2 long *ia*, the anterior as in *proocellata*; *pra* as long as the *prst acr* and much longer than the second *npl*; auxiliary prostigmal almost as long as the prostigmal and propleural, anterior mesopleural distinct, 1+2 strong *stpl*, hypopleura bare, metathoracic spiracle large; scutellum wholly testaceous, with fine long erect hair which does not extend beyond level of the strong setae. *Abdomen* subcircular, piceous with thin greyish and brownish dust, the brownish dust mainly on median part, but there is no definite pattern; anterior segments with long lateral marginals, third with lateral discals and a row of strong marginals, fourth with a row of strong discals and strong marginals, hypopygium somewhat prominent, fourth ventrite with a rather broad subtriangular excision. *Wings* subhyaline, slightly yellowish, with testaceous veins, costal spine absent, r_{4+5} bare like the other veins; r_{4+5} slightly sinuous at apex, *m* practically straight, the two veins somewhat converging just before apex, *m-m* slightly concave, rather upright. Calyptrae subopaque, pale yellowish with concolorous border and fringe. Halteres pale reddish-yellow. *Legs* wholly pale testaceous, inclusive of coxae and trochanters but excluding tarsi, which are strongly infuscated ; fore tibia with (type) or without (paratype) a *p* seta, mid femur with a row of slightly longer *a* setulae on basal two-fifths, with an *a* pre-apical, the normal *p* to *pd* pre-apicals and with 5–7 long *v* setae on basal half, mid tibia with 3 *p* setae; hind femur with a row of long *ad* and *av* setae, hind tibia with 2 *ad* and 3–4 *av*. ♀ unknown.

Length.—5·4 mm., of wings 5·8 mm.

Distribution.—N.E. BURMA: Kambaiti, 2,000 m., 24.V.34 (*R. Malaise*), ♂ type (in Mus. Stockholm), 23.V.34, 1 ♂ paratype (in B.M.).

94. **Phaonia acrostichalis** sp. n.

♂: Fuscous with moderately thin grey dust, undusted thoracic vittae and shifting abdominal spots; tibiae and posterior femora pale testaceous. *Head* densely dusted silver with fuscous-black interfrontalia; eyes with (sparse?) rather long hairs, separated by one-tenth head-width, interfrontalia obsolescent above middle and forming a small elongate triangle above and a somewhat larger one below, parafrontalia at and above middle twice as wide as an ocellus, somewhat narrower near vertex, widening towards lunula, with five pairs of moderately strong inclinate setae on lower three-fifths, ocellars rather weak, verticals apparently indistinct; parafacialia one-half, jowls twice, width of third antennal segment; vibrissal angle not produced, head much shorter at mouth-margin than at lunula (by about width of antenna). Antenna fuscous. Palpi fuscous-brown. *Thorax* with the paramedian vittae complete in posterior view, fuscous and not quite reaching second *post dc* in dorsal view (when a blackish posterior median vitta appears), outer vittae interrupted and incomplete, somewhat converging towards and more or less fusing posteriorly with the paramedian ones; 2–3+ *c.* 4 rather weak *acr*, the last *prst* pair being the strongest of all, 2+3 *dc*, the first moderately strong, the others unusually long and strong, 2 rather strong *post ia*, the anterior one before level of *sa*; *pra* (pore!) subequal to second *npl*; auxiliary prostigmal indistinct, anterior mesopleural distinct, hypopleura quite bare, metathoracic spiracle not enlarged; scutellum with long very fine erect hairs on dorsum. *Abdomen* in posterior view with a subinterrupted dark median vitta and at the base of each segment a large transverse shifting dark spot which extends beyond middle behind, reaches lateral surface and is separated from that of the other side by about the width of a femur; all segments with strong lateral marginals and weak lateral discals, second with a row of weak marginals, third and fourth with a row of strong ones, third with a row of weak, fourth with moderately strong, discals. *Wings* subhyaline with a very slight brownish tinge, veins brown, *r-m* and *m-m* slightly suffused; all veins bare (except *c*), membrane evenly haired, r_1 reaching level of *r-m*, r_{4+5} somewhat sinuous, markedly diverging from *m*, which is somewhat curved backward

at tip, *m-m* slightly concave, only very slightly oblique. *Legs* with infuscated coxae and tarsi, testaceous trochanters, tibiae and posterior femora and largely fuscous front femur, hind femur with a dorsal infuscation on apical third, fore tibia with a *p* seta at middle; mid femur with an *a* and three *p* to *pd* pre-apicals, a row of longer *av* hairs and of quite conspicuous *pv* bristles, mid tibia with 2 *p* setae near middle; hind femur with a row of small *av* setae on apical half with a stronger *av* pre-apical, an irregular row of weak *pv* setae, and a rather strong *p* and a weaker *pd* and *d* pre-apical, hind tibia with a strong *pd* beyond apical third, an *ad* at middle (on one side another small one at level of the *pd*), and 1–2 small *av* near middle.

Length.—5·3 mm., of wings 5·9 mm.

Distribution.—N.E. BURMA: Kambaiti, 2,000 m., 8.IV.34 (*R. Malaise*), ♂ type (in Mus. Stockholm).

Most of the setae of the type are lost, otherwise it is in good condition.

95. **Phaonia latecostata** sp. n.

♂ ♀: Fuscous with conspicuous grey dust and undusted vittae, scutellum and shoulders in female testaceous, legs testaceous. *Head* densely dusted silver with fuscous-black interfrontalia; eyes with not very dense rather short hairs, separated in male by one-fourteenth head-width, interfrontalia and parafrontalia as in *acrostichalis*, but the 10–12 inclinate frontal setae forming a denser row and gradually becoming weaker and hair-like, reaching about upper third, ocellars and verticals weak but rather distinct; vertex of female slightly more than a quarter head-width, interfrontalia parallel-sided, slightly narrowed at lunula, frontal triangle subshining, slightly exceeding middle of frons, parafrontalia at middle one-third width of interfrontalia, with 4–5 strong inclinate setae on anterior half between the inclinate and reclinate setae, 1–2 setulae, outward to the row of setae with an irregular row of proclinate black setulae, inner verticals very strong, ocellars and outer verticals rather strong; parafacialia two-thirds, jowls fully twice, width of third antennal segment. Antennae dull brown in male with pale joints, pale orange in female with the second segment somewhat browned and more than apical half of third infuscated; palpi dull orange with brown apex in male, orange in female; arista with dense long rays. *Thorax* with the pattern as in *acrostichalis*; chaetotaxy similar, but *prsc acr* much stronger than any *prst acr*, anterior *prst dc* strong, *pra* considerably

longer than second *npl*; otherwise as in *acrostichalis* but scutellum with denser, less erect and less fine hair. *Abdomen* of male elongate-ovate, of female ovate, moderately densely dusted with a narrow somewhat suffused dark median vitta and on each side a large shifting basal spot, which extends to about middle third of length and to lateral surface, fourth segment of female with only a triangular area in each anterior angle dark; all segments with distinct lateral marginals, second with a row of weak marginals, third and fourth each with a row of strong marginals and discals, but the discals absent from the third segment of the female. Hypopygium moderately large but not prominent, cerci testaceous, lobes of fourth ventrite somewhat prominent with suffused yellowish margins. *Wings* subhyaline with brown veins, *r-m* and *m-m* darker and slightly suffused in male, membrane evenly haired, veins without setulae, *2C* enlarged, markedly wider in male than R_3, R_5 broadened to apex. Calyptrae whitish with concolorous border and fringe. Halteres pale yellow. *Legs* rather long and slender, fore tibia without a *p* seta but with the *pv* hairs in male semi-erect, fine and not much shorter than tibial diameter; mid femur with a row of fine moderately long *pv* setae, a small *a* pre-apical and the usual *p* and *pd* pre-apicals, mid tibia with 2–3 *p* setae, hind femur with a row of strong *ad* and of fine short *av* and *pv* setae, only 2–3 pre-apical *av* somewhat stronger, hind tibia with 2 *ad* and 2–3 rather weak *av* setae.

Length.—7–7·8 mm., of wings 7·0–8·3 mm.

Distribution.—N.E. BURMA: Kambaiti, 2,000 m., 6.IV.34 (*R. Malaise*), ♂ type, 1 ♂ paratype, 24.V.34, 1 ♀ paratype (type in Mus. Stockholm, ♂ paratype in B.M., ♀ paratype in Mus. Helsinki).

96. **Phaonia flavinota** sp. n.

♀: Fuscous with pale ferruginous thorax, legs, except for piceous-brown tarsi, and base of abdomen. *Head* fuscous with grey or brownish-grey dust, parafacialia with a not very conspicuous dark shifting spot at level of lunula; eyes thinly but distinctly short-haired, frons at vertex almost a quarter (0·22–0·24) head-width, markedly dilated with very slightly concave sides, at least a third head-width at lunula (0·33–0·38), frontal triangle slightly shining, very narrow and drawn out almost to lunula, interfrontalia dull reddish-fuscous, four times as wide at middle as a parafrontale, the latter on anterior three-fifths with 4 strong and 1–2 weak inclinate setae and on outer part with an irregular row of

proclinate black setulae; ocellars and verticals strong; parafacialia over a third the width, jowls one-and-a-half times the width, of third antennal segment. The latter virtually reaching mouth-margin, arista with rays of rather even length, about as long as width of third antennal segment, to about apical fourth; edges of second and base of third segment ferruginous-translucent; palpi and mentum dull brown. *Thorax* almost undusted, but with some thin whitish dust towards neck, where a trace of the usual paramedian undusted vittae is therefore visible; with 0+1 *acr*, the latter slightly before or at level of last *dc*, *acr* hairs in front of suture in *c*. 8 rows (6 between the vittae), very fine, half-erect; 2+3 strong *dc*, 2 strong *ia*, the anterior one well before level of *sa*, *pra* much longer than second *npl*; auxiliary prostigmal not very strong; anterior mesopleural fine and small; 1+2 *stpl*. *Abdomen* with a linear hind margin of the first, and the second to fourth segments fuscous-black, evenly but moderately thinly grey-dusted, tip of fourth segment and underside of abdomen somewhat dull reddish-yellow translucent; all segments with distinct lateral marginals, the third and fourth with a marginal row each, the fourth also with a row of strong discals, the third with a discal row towards sides. *Wings* subhyaline with a brownish-grey tinge, veins brown with pale base, without setulae, membrane evenly haired; r_{4+5} and *m* somewhat converging at apex, r_{4+5} being slightly sinuous, *m* very slightly upcurved at tip, *m-m* somewhat concave. Calyptrae ochraceous, the lower one strongly projecting, with concolorous or slightly browned border, the upper one with brown border, fringe golden. Halteres pale reddish-yellow. *Legs* pale with piceous-brown tarsi, fore tibia without median setae; mid femur with 3 erect *v* setae on basal two-fifths and with the normal pre-apicals, mid tibia with 2 strong *p* setae; hind femur with a row of *ad* setae, the *av* ones distinct only on about apical half where 2–3 pre-apicals are strong, *pd* and *d* pre-apicals present, hind tibia with 2 strong *ad* and 2–3 small *av* setae.

Length.—6·3–7·5 mm., of wings 7·3–7·8 mm.

Distribution.—S. INDIA: Kodaikanal, 7,000 ft., 23–25.III.36 (*B.M.-C.M. Expedition to S. India*), ♀ type, 2 ♀ paratypes (type and paratype in B.M., 1 paratype in Colombo Museum).

97. **Phaonia rubriventris** sp. n.

♂ ♀: Piceous with thin brownish-grey dust and pale orange abdomen, hind legs including coxae pale orange with piceous tarsi and browned knee regions. *Head* dusted greyish-brown,

anterior part of jowls dull orange; eyes in male contiguous, densely hairy, the hairs less than twice as long as diameter of ocelli, interfrontalia visible as two small triangles on less than anterior and posterior thirds, parafrontalia linear, somewhat broader in front where 4–5 inclinate setae are confined to anterior third, ocellars strong, verticals quite long but not differentiated from 1–2 of the adjacent occipital setulae; in female eyes thinly short-haired, separated at vertex by more than a quarter (0·27), at lunula by two-fifths, head-width, frontal triangle slightly shining and very narrow, gradually fading out towards lunula, interfrontalia piceous, somewhat reddish near lunula, almost parallel-sided, at middle five times as wide as a parafrontale, the latter dusted pale grey, with 4–5 inclinate setae and 1–2 setulae, ocellars and inner and outer verticals strong; parafacialia, jowls and antennae as in *flavinota*, the antennae, however, wholly piceous with fuscous third segment, which in female is just over three times length of second, aristal rays also as in *flavinota* but slightly shorter, the third antennal segment being less wide. Palpi and mentum dark brown. *Thorax* in posterior view quite visibly dusted in front of suture, with the normal four vittae, which, however, become quickly indistinct behind suture; 0+1 *acr*, sometimes 1–2 presutural hairs longer and stronger, 2+3 strong *dc*, 2 strong *ia*, the anterior one not much behind level of first *post dc*, *pra* subequal to second *npl*; auxiliary prostigmal hair-like, anterior mesopleural fine but very distinct; 1+2 strong *stpl*. *Abdomen* without any trace of a pattern, short-ovate, dorsally with short and decumbent hair, with short lateral marginals, on second segment with a row of weak marginals, on fourth and especially third with a row of strong marginals, on third segment with some lateral discals, on fourth with a row of strong discals. *Wings* subhyaline with a slight greyish-brown tinge, membrane evenly haired, veins brown, without setulae, r_{4+5} and *m* rather distinctly diverging at apex, *m-m* almost straight, very upright. Calyptrae brownish subhyaline with brown border and fringe. Halteres pale reddish-yellow. *Legs* of normal length, the anterior ones hardly pale translucent at knees, fore tibia without submedian setae; mid femur without distinct *av* or *pv* setae, with an *a* and *ad* pre-apical in addition to the *p* to *pd* ones, mid tibia with 3 strong *p* setae (in one specimen on one side only 2); hind femur with a row of strong *ad* setae, the *av* ones weak at base, stronger towards, and especially at, apex, hind tibia with (1–)2 rather strong *ad* and 3(–5) small *av* setae.

Length.—5·4–6·5 mm., of wings 5·8–6·7 mm.

Distribution.—N.E. BURMA: Kambaiti, 2,000 m., 5.V.34 (*R. Malaise*), ♂ type, 1 ♂ paratype, 28.IV–9.V.34, 3 ♂ 2 ♀ paratypes (type and paratypes in Mus. Stockholm, paratypes in B.M. and Mus. Helsinki). N. INDIA: Darjeeling, 7,000 ft., 29.V.10 (*Brunetti*), 1 ♂ paratype (in Zoological Survey of India, Calcutta).

98. **Phaonia glauca** Malloch.

1931. !*Phaonia glauca* Mall., *Ann. Mag. n. H.* (10), **VII**, 188. Type: Fraser's Hill, Pahang. B.M.

♂ ♀: Fuscous-black with pale testaceous scutellum and pale ferruginous legs with piceous tarsi and more or less darkened coxae, densely dusted cinereous-grey. *Head* with a spot at level of second antennal segment and on anterior part of jowls appearing fuscous in certain directions; eyes thinly short-haired, in male separated by one-tenth head-width, interfrontalia at middle four times as wide as the parafrontalia, the latter densely dusted greyish-white like the parafacialia, with 3 strong inclinate setae on anterior third and 4 inclinate setulae on intermediate third, ocellars strong, verticals indistinct; frons of female a quarter head-width at vertex, rather strongly dilated to lunula, frontal triangle inconspicuous, only slightly shining, approaching lunula, interfrontalia fuscous, gradually somewhat broadened forward, almost four times as wide at middle as a parafrontale, the latter with 3 strong inclinate setae and, alternating and above them, about 3 setulae, outer part of parafrontalia with an irregular row of proclinate black setulae, ocellars and inner verticals strong, outer verticals rather short. Antennae reaching mouth-margin, fuscous-brown like the palpi, the proximal segments testaceous translucent at margins; arista long-plumose to apex, 6–8 rays being half as long again as width of third antennal segment. *Thorax* densely and uniformly dusted pale grey, the dust sometimes more brownish on disc, with a short trace of darker grey paramedian vittae at neck, the postalar callosities testaceous translucent; 0+1 strong *acr*, 2+3 strong *dc*, 2 strong *ia*, the anterior one half-way between levels of first *post dc* and *sa*, *pra* much longer than second *npl*; auxiliary prostigmal and anterior mesopleural well developed, 1+2 strong *stpl*, metathoracic spiracle large in male, of moderate size in female, upper anterior part of hypopleura with some long fine pale hairs. *Abdomen* subcordate to short-ovate, evenly and moderately densely dusted pale grey, with conspicuous

lateral marginals and discals, third segment with a row of strong, fourth with one of weak, marginals, fourth with a row of strong discals. *Wings* subhyaline, conspicuously yellowish anteriorly and proximally, membrane evenly haired, veins light brown, ochraceous at base, without setulae; r_{4+5} distinctly sinuous and *m* slightly upcurved at tip. Calyptrae yellowish-white to pale ochraceous with concolorous border and pale golden fringe. Halteres dull reddish-yellow. *Legs* of normal length, fore tibia without a *p* seta; mid femur with 2–3 weak *av* and strong *pv* setae on basal two-fifths, with a few short *av* setae near apex and with an *a* and 3–4 *p* to *pd* pre-apicals, mid tibia with two strong *p* setae; hind femur with a row of strong *ad*, a more widely spaced row of weak *av* setae, 2–3 of the latter near apex being long and strong, and a *p* and *pd* pre-apical, hind tibia with 2 *ad* and two small *av* (one leg of one female with only 1 *ad* and 1 *av*).

Length.—6·3–7·0 mm., of wings 6·3–7·7 mm.

Distribution.—MALAYA: Fraser's Hill, 4,000 ft., Pahang (type); Cameron Highlands, 5,000–5,500 ft., Pahang; Gunong Tahan, 5,550 ft., Pahang, 7, and 23.XII.22 (*H. M. Pendlebury*).

99. **Phaonia venisetosa** sp. n.

♀: Fuscous-black with rather thin whitish-grey dust, four black thoracic vittae and shifting abdominal spots; legs pale ferruginous with piceous tarsi. *Head* densely dusted whitish-grey; eyes rather densely short-haired, separated at vertex by a quarter to almost a third (0·26–0·31) head-width, frons rather strongly broadened to lunula, frontal triangle poorly defined, slightly shining, narrow, almost reaching lunula, interfrontalia matt black, slightly widened from ocelli to anterior inclinate setae, but somewhat narrowed at anterior extremity, at middle almost five times as wide as a parafrontale, the latter with 4–6 inclinate setae, 1–2 inclinate setulae behind them and outward of the setae an irregular row of very small proclinate black setulae; ocellars and verticals strong; parafacialia as wide, jowls almost thrice as wide, as third antennal segment; arista long-plumose, the rays becoming quickly shorter from middle to apex, longest ones almost twice as long as width of third antennal segment, antennae and palpi fuscous. *Thorax* with almost parallel moderately narrow fuscous paramedian and rather broad interrupted outer vittae, the latter divided behind suture by a pale dusted vitta along the *ia*; in a vertical dorsal view the vittae tend to coalesce behind suture,

as the disc is overlaid with dark brown dust, disc of scutellum with shifting pale dusted and dark dots; 0+1 weak *acr*, 2+3 strong *dc*, 2 strong *ia*, the anterior one hardly behind level of anterior *post dc* and only slightly behind level of *pra*, which is fully twice as long as the short second *npl*; auxiliary prostigmal hair-like (seldom distinct), anterior mesopleural very fine and small, 1+2 strong *stpl*; metathoracic spiracle rather large. *Abdomen* short-ovate with pointed apex, fuscous with rather dense whitish-grey and in places brownish dust, which defines large irregular shifting spots, and a suffused blackish median line, in posterior view the basal half of the intermediate segments appearing mostly black, the apical half mostly pale with black dots at the base of the setae; all segments with lateral marginals, third with a row of marginals, fourth with a row of discals and of very weak marginals. *Wings* subhyaline with a brownish tinge and conspicuously suffused *r-m* and *m-m*, r_{4+5} with a few rather long black setulae on basal part of underside, apex somewhat sinuous, apex of *m* virtually straight, *m-m* somewhat concave but hardly oblique. Calyptrae yellowish-grey, usually with suffusedly ochraceous border, fringe pale golden. Halteres dull reddish-yellow. *Legs* of normal length, fore tibia with 2 *p* setae; mid femur with 1–3 strong *v* setae on basal two-fifths and a small *a* and three strong *p-pd* pre-apicals, mid tibia with 2–3 *p* setae; hind femur with a row of numerous rather short *ad* setae, 2–3 *av* setae near apex, and a *pd* and two *d* pre-apicals, hind tibia with two *ad* and 2–3 *av* setae.

Length.—7·5–9·5 mm., of wings 7·5–10 mm.

Distribution.—N.E. Burma: Kambaiti, 2,000 m., 11.V.34 (*R. Malaise*), ♀ type, 1 ♀ paratype, 23.IV–24.V.34, 5 ♀ paratypes (type in Mus. Stockholm, paratypes in Mus. Stockholm, Helsinki and B.M.). An additional ♀ from the same locality, 26.IV.34, is only 6·3 mm. long with a wing length of 6·7 mm. It has only one *p* seta on the fore tibiae.

100. **Phaonia basichaeta** sp. n.

(Fig. 71)

♂ ♀: Fuscous with rather dense cinereous-grey dust, four (posteriorly six) undusted thoracic vittae, shifting abdominal spots, pale translucent apical part of scutellum—in male the entire scutellum—and pale ferruginous legs with piceous tarsi. *Head* in male dusted silver-grey without a distinct dark spot at level of lunula, eyes with rather long not very dense hair, separated by less than a tenth (0·074) head-width,

interfrontalia as wide as a parafrontale at upper third, slightly widened above, half as wide again as ocellar tubercle below, parafrontalia moderately widened below, with 9–10 inclinate setae which decrease in size and become hair-like above, almost reaching level of anterior ocellus, ocellars rather strong, verticals apparently weak or indistinct; in female (Fig. 71) dusted pale ashy-grey with a conspicuous dark shifting spot at level of second antennal segment, eyes not very densely short-haired, separated at vertex by approximately three-tenths (0·28–0·31) head-width, frons considerably widened to lunula, frontal triangle inconspicuous, somewhat grey-dusted, reaching about anterior third of interfrontalia, the latter fuscous-black, 3–4 times as wide at middle as a parafrontale, slightly and evenly narrowed to the second reclinate setae, slightly widened anteriorly but slightly narrowed again from second inclinate seta to anterior extremity, parafrontalia with 3–4 inclinate setae and interspersed setulae, and an irregular row of quite

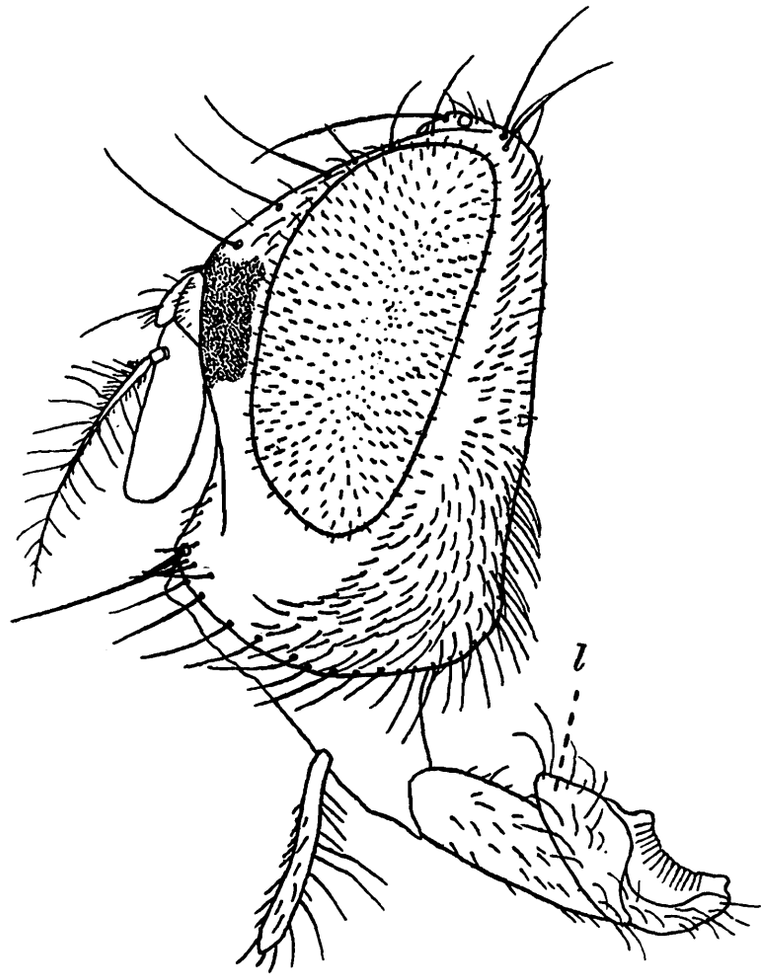


FIG. 71. *Phaonia basichaeta* sp. n., head of female. *l*, labellar appendage.

conspicuous proclinate black setulae on outer part, ocellars and verticals strong; parafacialia as wide, jowls more than thrice as wide, as third antennal segment. Palpi and antennae fuscous, arista plumose, the hairs becoming shorter on apical two-fifths or third, longest hairs about one-third longer than width of third antennal segment, the latter falling short of mouth-margin by its own width. *Thorax* with four moderately broad dark vittae, the paramedian ones parallel and wider than the median pale dusted vitta, even wider behind suture and more or less fused from suture to first *post dc*, outer vittae broad, very narrowly interrupted at suture, and divided by a pale dusted vitta from a little behind suture to almost hind end; 0+1 moderately strong *acr*, 2+3 strong *dc*, 2 strong *ia*, the anterior one slightly behind level of first *post dc*, *pra* more than twice length of the unusually short second *npl*; auxiliary prostigmal and anterior mesopleural conspicuous, 1+2 strong *stpl*, metathoracic spiracle large (♂) or rather large (♀). *Abdomen* short-ovate, with not very thick dust, the intermediate segments in male appearing brown in lateral and almost entirely fuscous-black in posterior view, fourth segment of male and all segments of female with large shifting dark spots, their boundaries being formed especially by median line and an oblique line from anterior paramedian region to posterior dorsolateral region; lateral marginals distinct, third segment with a row of strong, fourth with one of strong (♂) or weak (♀) marginals and a row of moderately strong discals. *Wings* moderately hyaline with a slight brownish tinge, veins without setulae, brown with more or less testaceous bases, slightly suffused, especially *m-m*, which is conspicuously concave. Calyptrae pale ochraceous, with concolorous border and pale golden fringe. Halteres pale reddish-yellow. *Legs* of normal length, fore tibia without submedian setae; mid femur (missing in ♂ type) with 3–4 strong *v* setae in basal half, a small *a* and the normal 3 *p* to *pd* pre-apicals, mid tibia with 2 strong *p* setae; hind femur with a dense row of short *ad* setae, 2–3 rather strong pre-apical *av* and a *pd* and *d* pre-apical, hind tibia with an additional *pd* seta at basal sixth to fourth, 2 *ad*, the proximal one small and not far from the proximal *pd*, and 2–3 very small *av* setae.

Length.—7·0–7·5 mm., of wings 6·4–7·4 mm.

Distribution.—N.E. BURMA: Kambaiti, 2,000 m., 17.VI.34 (*R. Malaise*), ♂ type, 6.IV–11.V.34, 7 ♀ paratypes (type in Mus. Stockholm, paratypes in Mus. Stockholm, Helsinki and B.M.).

101. **Phaonia xanthopleura** sp. n.

♀: Pale ferruginous with fuscous head and third antennal segment and piceous abdomen and tarsi, mesonotum broadly infuscated with ferruginous paramedian vittae. *Head* somewhat ferruginous translucent below and in front; eyes rather conspicuously short-haired, separated at vertex by almost two-fifths head-width and at lunula somewhat more widely, frontal triangle reaching middle, not distinctly produced forward, interfrontalia fuscous-brown, somewhat lyre-shaped, at middle five times as wide as a parafrontale, parafrontalia considerably widened from middle to lunula, with 4 strong inclinate setae, ocellars and verticals strong; parafacialia at middle two-thirds, jowls twice, the width of third antennal segment, the latter reaching mouth-margin; arista plumose, the rays very slightly decreasing in length from basal third to apical fifth, the longest ones slightly longer than width of third antennal segment. Proboscis with a large labellar appendage; palpi light brown with infuscated tip. *Thorax* with three thinly white-dusted infuscated vittae or rather a pair of paramedian undusted ferruginous vittae, which reach the second *post dc*, and the normal pair of broad outer undusted vittae, which pass gradually into the pale pleurae; scutellum wholly pale ferruginous, thinly dusted white, 0+1 rather strong *acr*, 2+3 strong *dc*, 2 strong *ia*, the anterior one very slightly behind level of first *post dc*, *pra* fully twice length of second *npl*; auxiliary prostigmal and anterior mesopleural conspicuous, 1+2 strong *npl*, metathoracic spiracle rather large. *Abdomen* short-ovate, evenly and rather thinly grey-dusted, the apex somewhat reddish translucent, the base rather narrowly pale ferruginous, conspicuous setae absent except for a pair of lateral discals on fourth segment and some marginals on third. *Wings* moderately hyaline with a yellowish tinge, especially at base, membrane evenly haired, veins testaceous without setulae, r_{4+5} almost inappreciably sinuous at apex, *m* very slightly curved back in its whole apical section, almost straight, R_5 thus very wide at apex, *m-m* almost straight, slightly oblique. Calyptrae pale ochraceous with concolorous border and pale golden fringe. Halteres pale reddish-yellow. *Legs* of normal length, fore tibia without a *p* seta; mid femur with 3 conspicuous erect *v* setae on basal two-fifths, an *a* pre-apical and the normal 3 *p* to *pd* pre-apicals, mid tibia with 3–4 *p* setae; hind femur with a row of numerous *ad* setae, 2 strong *av* pre-apicals and a *pd* and 2 *d* pre-apicals, hind tibia with a strong *pd* seta just beyond middle and 4 small *av* setae.

Length.—7·9 mm., of wings 7·7 mm.

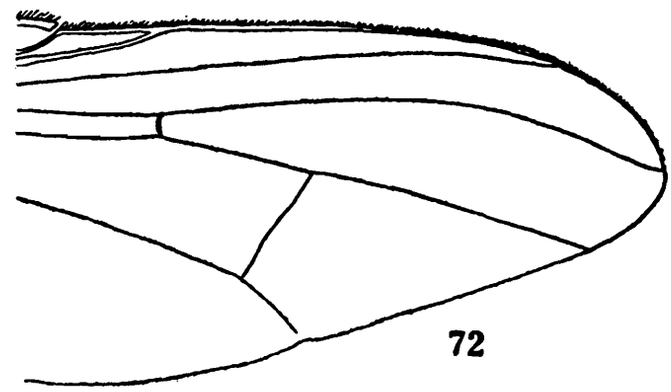
Distribution.—N.E. BURMA: Kambaiti, 1,800 m., 7.VI.34 (*R. Malaise*), ♀ type (in Mus. Stockholm).

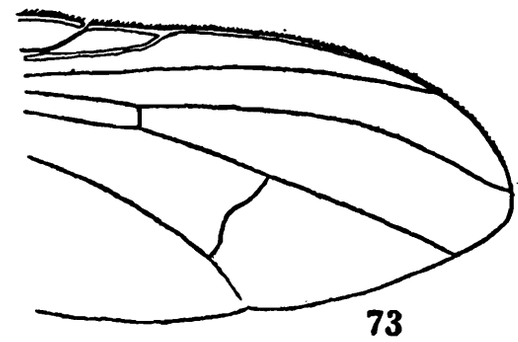
102. **Phaonia rectinervis** sp. n.

(Fig. 72)

♂ ♀: Fuscous with the shoulders, scutellum (or most of it), postalar declivity, some pleural sutures and the legs, except for the piceous tarsi, pale testaceous or ferruginous; thorax not very thickly white-dusted, with four dark undusted vittae. *Head* dull ferruginous translucent in some places in front and below, with not very dense pale grey dust, parafacialia in certain directions with a small dark spot at level of second antennal segment, eyes of male practically contiguous, with moderately dense long hairs, interfrontalia obsolete in upper two-thirds, visible as a small fuscous-brown triangle in anterior third, parafrontalia almost linear in upper half, moderately broadened anteriorly, with 3–4 moderately strong inclinate setae, alternating with setulae, on anterior third and a row of inclinate setulae on more than intermediate third, ocellars strong, verticals indistinct; in female the eyes with conspicuous moderately short hairs, frons a quarter head-width at vertex, slightly dilated to lunula, frontal triangle poorly defined, not reaching middle, interfrontalia very slightly dilated forward and somewhat narrowed at anterior extremity, four times as wide at middle as a parafrontale, the latter with 3–4 strong inclinate setae, in addition with small black proclinate hairs on outer part, ocellars and verticals strong; parafacialia at narrowest part hardly half width of third antennal segment, jowls half as wide again (in two females twice as wide) as third antennal segment. Antenna with light brown proximal segments and fuscous third; arista with rays of rather even length, the longest rays not quite as long as width of third antennal segment. Palpi fuscous-brown with paler base. *Thorax* rather thinly dusted grey with four undusted, moderately narrow vittae; 0+1 *acr*, 2+3 strong *dc*, 2 strong *ia*, the anterior one on a straight line imagined through the first *post dc* and the *sa*, *pra* almost or quite as long as first *post dc*; auxiliary prostigmal and anterior mesopleural rather fine but distinct; 1+2 strong *stpl*. *Abdomen* in male oblong-ovate, in female short-ovate, evenly thinly dusted grey with large shifting black areas and a dark narrow shifting median vitta, anterior two segments with several strong lateral marginals and lateral

discals, third, and in male fourth, with a row of strong marginals, fourth with a row of discals and in female a row of weak marginals. *Wings* subhyaline, somewhat yellowish tinged, with light brown veins which become testaceous at base, membrane evenly haired, veins without setulae; *2C* slightly broadened, R_5 strongly widened in basal two-thirds, very slightly narrowed in apical third (Fig. 72), r_{4+5} being slightly curved back and *m* virtually straight, *m-m* rather straight and upright. Calyptrae pale greyish-yellow to pale ochraceous, with pale yellow to ochraceous border and pale golden fringe. Halteres pale reddish-yellow. *Legs* rather slender, especially the tarsi, fore tibia without a submedian seta; mid femur with 3–4 fine *v* setae on basal two-fifths





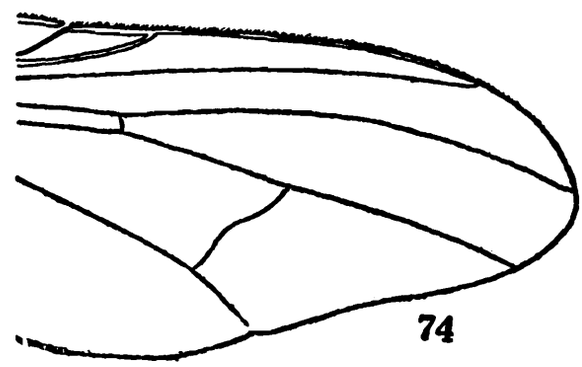


FIG. 72. *Phaonia rectinervis* sp. n., apical part of wing.
FIG. 73. *Phaonia flavomaculata* Mall., apical part of wing.
FIG. 74. *Phaonia longipalpis* sp. n., apical part of wing.

mid tibia with 2 *p* setae; hind femur with some widely spaced and weak *av* setae, of which only 1–3 pre-apicals are strong, and 1 *pd* and 1–2 *d* pre-apicals, hind tibia with an *ad* seta at middle and often a smaller one towards apical third, and with 3–5 weak *av* setae.

Length.—(5·3) 5·7–6·8 mm., of wings (6·0) 6·1–7·5 mm.

Distribution.—N.E. BURMA : Kambaiti, 2,000 m., 4.VI.34 (*R. Malaise*), ♂ type, 8.IV–28.V.34, 1 ♂ 2 ♀ paratypes (type, 1 ♀ paratype in Mus. Stockholm, 1 ♂ paratype in B.M., 1 ♀ paratype in Mus. Helsinki). There is also a female (in B.M.) to which the measurements in ( ) refer, collected 4.VI.34 with the type. In this specimen the vertex is 0·35 times head-width, the lateral part of the mesonotum towards and beyond *pra* and *sa* are testaceous, and the proximal antennal segments are pale testaceous.

103. **Phaonia flavomaculata** Malloch.

(Fig. 73)

1921. ! *Phaonia flavomaculata* Mall., *Ann. Mag. n. H.* (9), VIII, 416. Type: Gulmarg. B.M.

Fuscous with pale testaceous humeri, propleurae, pleural sutures and legs (with piceous tarsi) and with translucent testaceous postalar declivity, scutellum and abdominal base; head, abdomen and mesonotum with some pale grey dust, and the mesonotum with the normal four vittae. *Head* dusted somewhat silver-grey in front and below; eyes thinly but very distinctly short-haired, separated at vertex by almost a third head-width, frons moderately widened to lunula; frontal triangle narrow, poorly defined, slightly shining and more or less distinctly reaching lunula, interfrontalia five times as wide at middle as a parafrontale, parallel-sided with the anterior end somewhat narrowed, parafrontalia with 3–4 inclinate setae, on outer part with proclinate black setulae; ocellars and verticals strong; parafacialia half, jowls almost twice, as wide as third antennal segment. The latter fuscous, practically reaching mouth-margin, aristal rays of rather even length, slowly becoming shorter on apical third, the longest ones almost (in male fully) as long as width of third antennal segment, basal segments testaceous, second suffusedly browned. Palpi testaceous, with more or less infuscated apex, somewhat flattened and rather long. *Thorax* with moderately broad vittae, the outer ones divided by pale dust along the *ia*; 0+1 strong *acr*, 2+3 strong *dc*, 2 strong *ia*, the anterior one slightly behind level of first *post dc*, *pra* slightly shorter than the

latter; auxiliary prostigmal and anterior mesopleural fine but distinct, 1+2 strong *stpl.* *Abdomen* short-ovate, piceous with brownish-grey uniform dust, base of first segment translucent testaceous, in the type the whole of the first segment, except for a linear piceous margin, and the base of the second on either side near median line testaceous; setae as in *rectinervis.* *Wings* subhyaline, slightly yellowish tinged, membrane evenly haired; veins without setulae, light brown with testaceous base; *2C* slightly dilated, R_5 moderately widened to beyond middle, of almost even width in apical third (Fig. 73), r_{4+5} being slightly bent back and *m* virtually straight; *m-m* markedly concave, both apical angles of the discal cell being acute. Calyptrae pale ochraceous with concolorous border and pale golden fringe. Halteres pale reddish-yellow. *Legs* with rather long tarsi, fore tibia with 2 or 1 *p* seta; mid femur with some erect *v* setulae on basal half, but without distinct *v* setae, mid tibia with 2 (type) or 3 *p* setae; hind femur with a dense row of *ad* setae and with 3 strong *av* near apex, hind tibia with 2 *ad* and 4–6 small *av* setae, the proximal ones being the smallest.

Length.—6·8–8·2 mm., of wings 7·4–9·8 mm.

Distribution.—INDIA: Kashmir, Gulmarg, 8,500 ft. (♀ type). N.E. BURMA: Kambaiti, 2,000 m. There is in the Senior White collection a male from Mawphlang, Khasia Hills, 10.X.20, which may belong to this species, although the fore tibia has no *p* seta and the thorax and abdomen are wholly dark in ground-colour except for the scutellum, which is testaceous with suffused base. The Kambaiti material contains two females which are probably the present species but which have hardly any pale colour on the thorax and abdomen.

104. **Phaonia apicefemoralis** sp. n.

♂ ♀: Fuscous with pale-grey dust, four undusted thoracic vittae and shifting abdominal spots; femora and tibiae pale testaceous with the knee region broadly infuscated. *Head* rather densely dusted grey with a large fuscous spot below level of lunula; eyes in male with moderately long sparse hairs, separated by $\frac{1}{8}$–$\frac{1}{10}$ head-width, interfrontalia at middle about as wide as a parafrontale or almost linear, somewhat dilated in front and behind, parafrontalia somewhat dilated anteriorly with a row of 6–8 inclinate setae and some setulae on anterior two-thirds, ocellars rather fine but quite long, verticals fine and not very clearly differentiated though long; in female the eyes sparsely short-haired, separated at vertex by one-third head-width, frons considerably dilated with

slightly concave sides to lunula, where it is over two-fifths head-width, frontal triangle indistinctly reaching anterior third, interfrontalia at middle 4–5 times width of a parafrontale, the latter with 3–4 inclinate setae and some inclinate setulae, outer part with only odd black proclinate setulae, ocellars and outer verticals rather short, inner verticals strong; parafacialia somewhat narrower, jowls in female twice, in male more than twice, width of third antennal segment; the latter falling short of mouth-margin by half its own width; rays of arista evenly decreasing in length from middle onwards, longest rays markedly longer than width of third antennal segment. Palpi slender, fuscous-brown. *Thorax* with narrow fuscous-brown paramedian vittae, which in dorsal view do not quite reach second *post dc*, and with broader interrupted outer vittae, which are divided behind suture by pale dust along the *ia*; 0+1 conspicuous *acr*, 2+3 strong *dc*, 2 strong *ia*, the anterior one hardly behind level of first *post dc*, *pra* almost as long as the first *post dc*, as a rule more than twice the length of the short second *npl*; anterior thoracic spiracle infuscated, auxiliary prostigmal hair-like, anterior mesopleural distinct, 1+2 strong *stpl*. *Abdomen* ovate, grey-dusted with a narrow black median vitta, which in male is extended some way along hind margins, in dorsal view greater basal half of each segment broadly fuscous on either side; each segment with some well-developed lateral marginals and discals, third and in male fourth with a complete row of strong marginals, fourth with a row of strong discals and in female with weak marginals. *Wings* subhyaline, membrane evenly haired; veins browned, apical part of r_1 somewhat thickened and darkened, *r-m* and *m-m* somewhat suffused, costal margin of *2C* and *Sc* also sometimes slightly suffused; r_{4+5} conspicuously sinuous at apex, *m* evenly and slightly curved back, *m-m* rather straight. Calyptrae pale yellowish with concolorous border and fringe. Halteres pale reddish-yellow. *Legs* rather slender with piceous tarsi, coxae largely fuscous, rest pale testaceous with the apical fourth to half of the femora and the basal third of the tibiae more or less strongly infuscated; fore tibia with 2 *p* setae, mid femur with 2–3 rather strong erect *v* setae on basal half and in male with longer *av* hairs, mid tibia with 2–3 *p* setae; hind femur with 1–4 stronger *av* only near apex, hind tibia with 1–2 *ad* and 2–3 small *av*.

Length.—5·3–5·8 mm., of wings 5·4–5·9 mm.

Distribution.—N.E. Burma: Kambaiti, 2,000 m., 8.IV.34 (*R. Malaise*), ♂ type (Mus. Stockholm), 26.IV–11.V.34, 2 ♂ 4 ♀ paratypes (in Mus. Stockholm, B.M. and Helsinki).

105. **Phaonia freyana** sp. n.

♂ ♀ : Fuscous with moderately thick pale grey and brownish dust, with 4 (6) dark thoracic vittae and shifting dark abdominal spots, with pale testaceous femora and tibiae. *Head* dusted silver-white (♂) or pale grey (♀), with a large shifting dark spot on parafacialia at and below level of lunula; eyes in male with rather dense and moderately long hairs, separated by about a tenth head-width, interfrontalia at narrowest part slightly wider or slightly narrower than parafrontalia, slightly broadened to vertex, moderately to lunula, parafrontalia somewhat widened in front, with 5–7 not very strong inclinate setae on anterior three-fifths and a setula behind them, ocellars rather long, verticals rather long and distinct though fine; eyes of female with rather thin and short but distinct hair, separated at vertex by about three-tenths head-width (0·28–0·32) and at lunula by two-fifths or a little more (0·4–0·45), frontal triangle rather indistinctly extending almost to lunula, interfrontalia 3–4 times width of a parafrontale at middle, parafrontalia with 4–8 inclinate setae, some of which are small, ocellars and verticals strong; parafacialia two-thirds, jowls 1·5–2 times width of third antennal segment, the latter not quite reaching mouth-margin; arista with the rays becoming slightly shorter between middle and apical fourth, longest rays half as long again as width of third antennal segment. Palpi fuscous, broadened but little to apex; proboscis of female with a conspicuous labellar appendage. *Thorax* with moderately broad paramedian vittae, which in lateral view almost reach the second *post dc*, and with broad, conspicuously interrupted outer vittae, the posterior part of which is divided by a pale dusted vitta along the *ia*; 0+1 *acr*, 2+3 very strong *dc*, 2 strong *ia*, anterior one practically level with first *post dc*; *pra* almost as long as latter, more than twice length of second *npl*; anterior mesopleural distinct, 1+2 strong *stpl*. *Abdomen* ovate, setae and pattern as in *apicefemoralis*, but disc with more conspicuous brown dust and the shifting spots more clearly defined. *Wings* as in *apicefemoralis* but *m-m* somewhat concave and apical part of R_5 somewhat wider. Calyptrae greyish-white, subopaque with pale ochraceous border and fringe. Halteres pale reddish-yellow. *Legs* moderately slender, coxae infuscated at base, trochanters, femora and tibiae pale testaceous, apical third of femora sometimes slightly browned; fore tibia with 2 strong *p* setae; mid femur with 3–4 strong erect *v* setae on basal half and in male with rather long erect *av* hairs on basal part, mid tibia with 2–3 *p* setae; hind femur with a dense

row of *ad* setae but with distinct *av* only on apical half and especially near apex, where 2–3 strong pre-apicals are present, hind tibia with 2 *ad* and 2–3 small *av* setae.

Length.—5·5–8·0 mm., of wings 6·3–8·4 mm.

Distribution.—N.E. BURMA: Kambaiti, 2,000 m., 28.IV.34 (*R. Malaise*), ♂ type, 18.IV–4.VI, 1 ♂ 4 ♀ paratypes (type and 1 ♀ paratype in Mus. Stockholm, paratypes in B.M. and Helsinki).

106. **Phaonia malaiseana** sp. n.

♂ ♀: Fuscous with moderately dense pale grey, in places bluish-grey and brownish-grey, dust, with 4 (6) thoracic vittae and evenly dusted abdomen, which does not show shifting spots; legs pale testaceous with piceous-brown tarsi. *Head* densely dusted silver-white (♂) or pale grey (♀), parafacialia in female with a small or vestigial dark spot at level of second antennal segment; eyes sparsely short-haired, in male subcontiguous, interfrontalia developed as a very small triangle above and a somewhat larger one below, obsolete at and above middle, parafrontalia very narrow though everywhere conspicuous and dusted silver-white, slightly widened in front, with 4–5 short but quite strong inclinate setae on anterior half and 1–2 setulae, ocellars well developed, verticals small and rather indistinct; frons of female at vertex three-tenths to almost a third (0·28–0·33) head-width, at lunula less than two-fifths (0·36–0·39) head-width, frontal triangle slightly shining, indistinctly and narrowly produced forward almost to lunula, interfrontalia at middle four times as wide as a parafrontale, the latter on anterior half with 4–5 inclinate setae, of which 1–2 are small, ocellars and verticals strong; parafacialia half, jowls almost twice, width of third antennal segment, the latter almost reaching mouth-margin; rays of arista of even length to apical fourth, about half as long again as width of third segment or even longer. *Thorax* with rather narrow paramedian vittae and broadly interrupted broad outer vittae, the latter divided behind suture by a broad vitta of grey dust extending along the *ia* and laterally almost to the *sa*; 0+1 *acr*, 2+3 strong *dc*, 2 strong *ia*, the anterior one slightly behind level of first *post dc*, *pra* almost as strong as first *post dc*, more than twice as long as second *npl*; auxiliary prostigmal well developed, anterior mesopleural distinct, 1+2 strong *stpl*. *Abdomen* ovate, in male almost evenly and moderately thickly grey-dusted with a narrow undusted median vitta, minute black dots at the base of the hairs and bigger ones at the base of the setae, fourth segment with a larger undusted

spot on each side near apex; in female, in posterior view, almost evenly shining with narrow dusted basal bands, and in lateral or somewhat anterior dorsal view almost evenly dusted brown-grey; setae as in *apicefemoralis*. *Wings* subhyaline, with slightly yellowish, evenly haired membrane and light brown veins, which are devoid of setulae; R_5 slightly narrowed at apex, r_{4+5} being broadly curved backward (but slightly upcurved at extreme tip) and *m* virtually straight. Calyptrae pale ochraceous subopaque, with concolorous border and fringe. Halteres pale reddish-yellow. *Legs* with pale coxae, trochanters, femora and tibiae moderately slender; fore tibia without submedian setae; mid femur with a row of small *a* setae and, in male, of fine long *pv* setae on more than basal half, in female with only 2–3 strong *pv* setae on basal two-fifths, mid tibia with 2–3 *p* setae; hind femur with numerous strong *ad* setae, 2–3 strong *av* near apex and in male a few fine *av* on the whole length, hind tibia with (1–)2 *ad* and 2–3 rather small *av* setae.

Length.—4·4–7·6 mm., of wings 4·7–7·8 mm.

Distribution.—N.E. BURMA: Kambaiti, 2,000 m., 7.V.34 (*R. Malaise*), ♂ type (in Mus. Stockholm), 29 ♂ 7 ♀ paratypes 6.IV–4.VI.34 (in Mus. Stockholm, Helsinki and B.M.).

107. **Phaonia longiplumosa** sp. n.

♂: Fuscous with rather thick pale grey dust, four undusted thoracic vittae, some brown dust at base and in front of scutellum and on disc of abdominal segments; trochanters, femora and tibiae pale testaceous. *Head* densely dusted silver-white in front, grey below and behind; eyes densely long-haired; contiguous, interfrontalia forming an elongate triangle below, obsolete at middle and hardly visible as a minute triangle in front of anterior ocellus, parafrontalia almost linear in posterior half, somewhat widened to lunula, anterior half with 5–6 not very strong inclinate setae, posterior half with 4 setulose hairs, ocellars well developed, verticals fine but quite distinct; lunula conspicuously white-dusted, parafacialia hardly narrower than, jowls fully thrice as wide as, third antennal segment, the latter falling short of mouth-margin by less than its own width; arista long-plumose, rays progressively becoming shorter from middle onwards, longest rays twice as long as width of third antennal segment; basal antennal segment and base of arista testaceous, third antennal segment mostly infuscated; palpi dull brown. *Thorax* largely pale dusted, paramedian vittae in dorsal view almost reaching second *post dc*, in posterior view connected by a narrow

dark band along posterior side of suture, not reaching anterior *ia* laterally; 0+1 *acr*, 2+3 strong *dc*, 2 strong *ia*, the anterior one well behind level of first *post dc*, *pra* somewhat shorter than the latter but more than twice length of second *npl*; auxiliary prostigmal weak, anterior mesopleural distinct, 1+2 strong *stpl*. *Abdomen* subcircular with rather conspicuous lateral marginals on anterior two, and lateral discals on anterior three, segments, third with a complete row of strong marginals, fourth with a row of rather strong discals and marginals; in posterior view almost evenly dusted, the dust pale grey, broadly browned on disc of posterior three segments, but especially the second, with a narrow undusted median vitta and undusted dots at the base of the hair and setae (in posterior view a marginal row of many small ones on the second and of eight larger ones on the third are conspicuous), fourth segment with a larger shifting dark spot on each side. *Wings* subhyaline, slightly yellowish, with evenly haired membrane and testaceous veins, which are devoid of setulae; R_5 somewhat narrowed before apex, r_{4+5} evenly curved, slightly sinuous at apex, and *m* almost straight in apical sector. Calyptrae greyish-white subopaque with brownish-white border and whitish fringe. Halteres pale reddish-yellow. *Legs* with the base of the coxae broadly infuscated and the tarsi piceous-brown with paler joints and somewhat paler last segment; fore tibia without submedian setae; mid femur with 3–4 *pv* setae on basal half, mid tibia with 2 *p* setae; hind femur with a dense *ad* row, some long *av* setae, which become stronger near apex, on the whole length, 2–3 *pv* setae near middle, and some *pv* setulae towards and at apex, where they become closely placed, hind tibia with a row of subequal *ad* setulae on basal three-fifths, a strong *ad* towards apical third and 2–3 small *av* setae.

Length.—5·0–5·2 mm., of wings 5·5–5·7 mm.

Distribution.—N.E. BURMA: Kambaiti, 2,000 m., 31.III.34 (*R. Malaise*), ♂ type (Mus. Stockholm), 18.IV.34, 1 ♂ paratype (B.M.).

108. **Phaonia macrostemma** sp. n.

(Fig. 75)

♂: Fuscous with pale grey, in places pale bluish, dust and coalescing dark thoracic vittae, abdomen apparently rather evenly dusted with a moderately narrow median vitta, scutellum translucent light brown (specimen somewhat teneral), thinly dusted brownish-grey, basal antennal segments testaceous somewhat browned, legs pale testaceous with dark

brown tarsi. *Head* dusted pale cinnamon-brown and bluish-grey; eyes rather thinly long-haired, closely contiguous with strongly enlarged upper inner facets, interfrontalia almost obsolete behind, obsolete at and above middle, and visible as a rather broad triangle in anterior two-fifths, parafrontalia almost obsolete in posterior half, gradually broadening to lunula, on anterior third or less with 3 moderately strong inclinate setae, these are followed by a few setulose hairs which become smaller and sparser posteriorly but which extend almost to frontal triangle, ocelli unusually large, ocellars and verticals very fine, moderately long; parafacialia at middle only half, jowls more than twice, as wide as third antennal segment, the latter falling short of mouth-margin by half its own width; rays of arista slowly becoming shorter from middle onwards, longest rays as long as width of third antennal segment. *Thorax* (Fig. 75) with rather broad fuscous, brown-dusted vittae, the paramedian ones tending to coalesce at level of second *prst dc* and behind suture, the outer ones running from suture obliquely to second and third

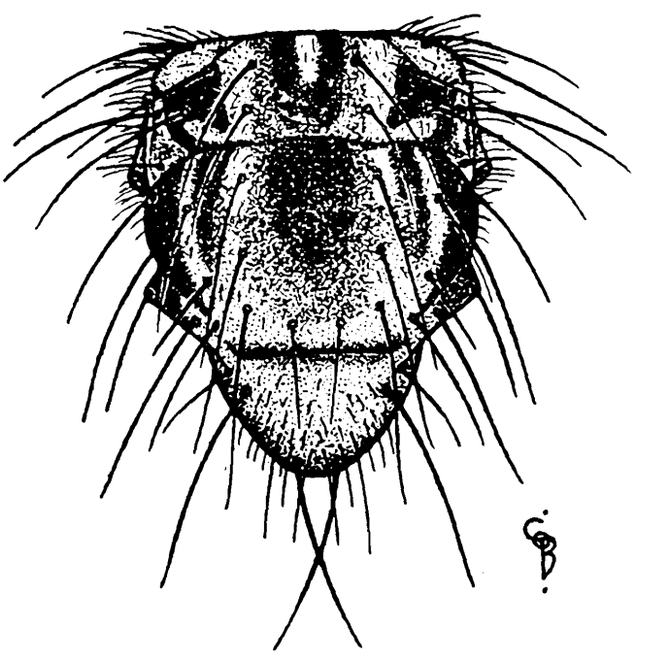


FIG. 75. *Phaonia macrostemma* sp. n., thorax of type.

post dc, broadly coalescing with the paramedian vittae, a vitta of pale greyish-brown dust along outer side of the *ia*; 0+1 strong *acr*, 2+3 strong *dc*, 2 strong *ia*, the anterior one somewhat behind level of first *post dc*, *pra* as strong as the latter, more than twice length of second *npl*; auxiliary prostigmal indistinct, anterior mesopleural distinct. *Abdomen* very

short-ovate, rather thinly and apparently evenly (greasy in type) dusted bluish-grey, setae as in *rectinervis*. *Wings* subhyaline, evenly haired, with light brown veins, which become slightly paler at base, and which are devoid of setulae; r_{4+5} somewhat sinuous near apex, somewhat converging towards *m*, which is virtually straight at tip, *m-m* almost upright and almost straight. Calyptrae subopaque, pale ochraceous with concolorous border and pale golden fringe. Halteres pale reddish-yellow. *Legs* with the coxae only slightly darker testaceous, fore tibia without a *p* seta; mid femur with 5 long fine *pv* setae on basal half and about 5 *p* (somewhat *pv*) setae on less than apical half, mid tibia with 2 *p* setae; hind femur with a rather dense *ad* row, a complete row of fine *av* setulae, the 2–3 pre-apical ones being somewhat stronger, and a row of fine *pv* setae on basal two-thirds, hind tibia with an *ad* seta at three-fifths and 4–5 rather small *av* setae.

Length.—5·4 mm., of wings 6·3 mm.

Distribution.—N.E. BURMA: Kambaiti, 2,000 m., 4.VI.34 (*R. Malaise*), ♂ type (Mus. Stockholm).

109. **Phaonia cilitibia** sp. n.

♂ ♀: Fuscous with moderately dense grey dust, 4 (6) thoracic undusted vittae and rather densely dusted abdomen with some shifting spots; legs pale-testaceous, often considerably browned. *Head* rather densely dusted pale grey with a rather indistinct dark spot at level of second antennal segment; eyes thinly short-haired, in male contiguous or subcontiguous, separated by less than a fifteenth head-width, interfrontalia obsolete or linear at and above middle, broadening quickly into a triangular fuscous area anteriorly, parafacialia sublinear behind, on anterior half with 4–6 inclinate setae, 1–2 of which are small, and with 2–3 setulose hairs between the setae and the ocelli, ocellars and verticals long and fine, but rather distinct; frons in female almost or fully three-tenths head-width at vertex and almost or fully two-fifths head-width at lunula, frontal triangle poorly defined, indistinctly approaching lunula, interfrontalia somewhat dilated from vertex towards lunula but a little narrowed at front end, 3–4 times as wide as a parafrontale, the latter with 3 strong inclinate setae and, on outer part, with a few proclinate black setulae, ocellars and verticals strong; parafacialia one-half, jowls almost two-and-a-half times, width of third antennal segment, the latter falling short of mouth-margin, which is somewhat produced, by almost half its own width, arista with almost equal rays to

apical third, the longest ones distinctly shorter than width of third antennal segment; palpi fuscous; proboscis of female with a short labellar appendage. *Thorax* with four, behind suture six, rather broad dark vittae, the inner ones connected at suture by a linear band, the outer ones interrupted; 0+1 rather weak *acr*; 2+3 strong *dc*, 2 strong *ia*, the anterior one slightly behind level of first *post dc*, *pra* hardly shorter than the latter, twice length of second *npl* or longer; auxiliary prostigmal hair-like, anterior mesopleural well developed, 1+2 strong *stpl*. *Abdomen* subcircular to short-ovate, in posterior view rather densely dusted cinereous-grey with a subtriangular fuscous median vitta on first to third segments, that on the third narrower, the base of the triangles situated at hind margin, fourth segment with a linear median vitta, disc on either side of the median vitta with some brown dust and towards sides with some smallish shifting dark spots; setae as in *apicefemoralis*. *Wings* subhyaline with a slight brownish tinge, membrane evenly haired, veins light brown, without setulae, r_{4+5} and *m* slightly converging in apical half of R_5, *m-m* rather upright, very slightly concave. Calyptrae subhyaline cream coloured with concolorous border and fringe. Halteres whitish-yellow. *Legs* with tarsi piceous, coxae usually, fore femora often, posterior femora and the tibiae sometimes infuscated or browned; fore tibia without submedian setae; mid femur with 2–3 *v* setae on basal half and, in male, with longer erect *av* and *pv* hairs, mid tibia with 2 *p* setae; hind femur with a row of dense *ad* setae, in male with a less dense row of very long and fine *av* and *pv* setae, and in female with a row of widely spaced *av* setae and in basal half 2–3 *v* setae, hind tibiae with 1(–2) *ad* and 2(–4) *av* setae, and near middle of *p* surface with 4–5 half-erect short setulose hairs.

Length.—3·9–5·9 mm., wings 4·5–6·0 mm.

Distribution.—N.E. BURMA: Kambaiti, 2,000 m., 7.V.34 (*R. Malaise*), ♂ type (Mus. Stockholm), 6.IV–7.VI.34, 31 ♂ 3 ♀ paratypes (Mus. Stockholm, Helsinki and B.M.).

110. **Phaonia breviplumosa** sp. n.

♂: Fuscous with moderately dense grey dust, which in places appears bluish, the four undusted thoracic vittae largely fused behind suture, abdomen very thinly dusted, shining, the tip narrowly pale testaceous, legs pale testaceous with piceous tarsi. *Head* dusted pale grey with contiguous thinly

short-haired eyes, the anterior facets of which are conspicuously enlarged, interfrontalia largely obsolete, a tiny triangle visible in front of ocelli and another small one at lunula, parafrontalia linear, slightly wider in front, with 5 rather fine inclinate setae and between them a few setulae on anterior half, and with 2–3 tiny setulae above, ocellars and verticals long and fine, one or two setae of the occipital row similar to the verticals, these otherwise quite distinct; parafacialia almost linear, jowls not quite twice width of third antennal segment, the latter falling short of mouth-margin by more than half its own width. Arista including plumosity one-half to three-quarters the width of the third antennal segment, rays becoming gradually shorter from second fifth to apex, the longest ones not quite half as long as width of third antennal segment; palpi ochraceous with browned apex. *Thorax* with rather long and dense sub-erect hairs, a few of which are present on notopleura; outer margin of the broad paramedian vittae touching the *dc* pores, these vittae fused behind suture, outer vittae narrowly interrupted at suture and coalescing with the paramedian ones half-way between the first and second *post dc*, the outer part of the outer vittae divided off by a tongue of grey dust from the suture to the second *ia*; 0+1 *acr*, 2+3 strong *dc*, 2 strong *ia*, the anterior one a little in front of level of *sa*, *pra* slightly shorter than the *dc*, fully twice as long as second *npl*; auxiliary prostigmal hair-like, anterior mesopleural well developed, 1+2 strong *stpl*. *Abdomen* subcircular in outline, with very thin brown-grey dust, wholly shining in posterior view, setae as in *apicefemoralis*. *Wings* subhyaline with a slight brownish tinge, membrane evenly haired, veins brown, somewhat paler at base, without setulae; R_5 slightly narrowed towards apex, tip of r_{4+5} somewhat sinuous, last section of *m* more than twice as long as last but one, *m-m* slightly oblique, very slightly concave. Calyptrae subopaque, pale ochraceous with concolorous border and fringe. Halteres pale reddish-yellow. *Legs* moderately slender, fore tibia with a *p* seta at middle; mid femur with longer erect hairs on *av* and *pv* surfaces and with 2 *a* and 4 *p* to *d* prè-apicals, mid tibia with 2 *p* setae; hind femur with a well-developed *ad* row, the *av* setae fine on more than basal half but the distal 5 setae quite strong, *pv* surface with only some stronger setulose hairs, hind tibia with 1 *ad* and 3–4 weak *av* setae.

Length.—4·9–5·3 mm., of wings 5·4 mm.

Distribution.—N.E. BURMA: Kambaiti, 2,000 m., 4.VI.34 (*R. Malaise*), ♂ type (Mus. Stockholm), 1.VI.34, 1 ♂ paratype (B.M.).

111. **Phaonia longipalpis** sp. n.

(Fig. 74)

♂ ♀: Fuscous with thin greyish dust and 4 (6) undusted thoracic vittae, apex of scutellum testaceous; legs pale testaceous with piceous tarsi. *Head* rather densely dusted grey with silver-grey parafacialia and parafrontalia, the latter appearing dark in female in anterior view; eyes in male rather thickly long-haired, contiguous or subcontiguous, interfrontalia obsolete or linear in more than upper half, forming a narrow triangle above lunula and sometimes a very small one in front of ocelli, parafrontalia linear, conspicuously widened near lunula, with 5–7 mostly small inclinate setae on anterior third and 6–8 small hairs from there to ocelli, ocellars well developed, verticals very fine but long and rather distinct; eyes of female distinctly haired but the hairs rather short and not very dense, vertex almost three-tenths (0·26–0·29), frons at lunula almost two-fifths (0·36–0·39), head-width, frontal triangle poorly defined, slightly shining, produced to lunula, interfrontalia at middle 3–4 times width of a parafrontale, the latter with 3–5 strong and 2–3 very small inclinate setae, outer part with rather numerous proclinate black setulae, ocellars and verticals strong; parafacialia almost half, jowls almost twice, width of third antennal segment. The latter almost reaching mouth-margin; arista long, rays of subequal length on basal three-fourths, the longest ones $\frac{3}{4}$–$\frac{4}{5}$ as long as width of third antennal segment, palpi normal in male, flattened and markedly exceeding mouth-margin in front in female. *Thorax* with four suffused moderately narrow and rather inconspicuous vittae, the broader outer ones divided behind suture by pale dust along the *ia*, scutellum fuscous with the margin rather broadly but suffusedly testaceous, except near base; 0+1 rather strong *acr*; 2+3 strong *dc*, 2 strong *ia*, the anterior one slightly behind level of first *post dc*, *pra* slightly shorter than the latter, usually not quite twice length of the second *npl*; auxiliary prostigmal and anterior mesopleural well developed, 1+2 strong *stpl*. *Abdomen* short-ovate to ovate, in female pointed at apex, in male with a linear dark median vitta, on disc with some brownish dust and often brassy reflections and with some slight shifting dark spots towards sides and apex, in female shining with some brassy reflections and with thin dust becoming visible in certain directions; setae as in *apicefemoralis*. *Wings* subhyaline with a brownish tinge, membrane evenly haired, veins brown with somewhat paler bases and without setulae; r_{4+5} somewhat curved back, slightly

sinuous at apex (Fig. 74), *m* almost straight, *m-m* moderately oblique and rather sinuous. Calyptrae ochraceous, subopaque, with concolorous border and fringe. Halteres pale ochraceous. *Legs* with fuscous or strongly infuscated coxae; fore tibia without a submedian seta; mid femur with a row of *c.* 6–8 erect *v* setae on basal half, mid tibia with 2–3 *p* setae; hind femur with a rather dense *ad* row and a complete widely spaced *av* row, the *av* setae of the apical half markedly stronger, the *pv* surface with some setae on proximal three-fifths, hind tibia with 1–3, normally 2, *ad* and 3–5 *av* setae.

Length.—5·0–8·3 mm., of wings 5·4–8·6 mm.

Distribution.—N.E. BURMA: Kambaiti, 2,000 m., 1.VI.34 (*R. Malaise*), ♂ type (Mus. Stockholm), 6.IV–17.VI.34, 75 ♂ 28 ♀ paratypes (Mus. Stockholm, B.M. and Mus. Helsinki).

The labella are rather narrow, and the pseudotracheae are not clearly visible in undissected specimens. From the same locality two females are at hand in which only the tip of the scutellum is testaceous and the frons considerably wider, the vertex occupying 0·35 of the head-width and the frons at lunula more than two-fifths (0·41–0·43). In other respects these two specimens do not seem to differ from *longipalpis*.

112. **Phaonia magnipalpis** sp. n.

(Fig. 76)

♂ ♀: Fuscous with thin whitish-grey dust and 4 (6) subequal undusted vittae, scutellum of male translucent testaceous at tip, femora and tibiae pale testaceous, base of latter and apex of femora often somewhat browned, in male and sometimes female fore femora or even all femora largely browned. *Head* dusted grey, in male with silvery parafacialia and outer anterior part of parafrontalia, in female with a conspicuous dark spot at level of arista; eyes in male densely long-haired, contiguous or subcontiguous, interfrontalia and parafrontalia linear, the latter considerably dilated and with about 5 inclinate setae on anterior third and with about 6 small hairs from there to anterior ocellus, ocellars well developed, verticals long and very fine, distinct; eyes in female (Fig. 76) conspicuously short-haired, separated at vertex by almost or fully three-tenths, at lunula by almost two-fifths, head-width, ocellar triangle indistinct, a slightly shining median line gradually becoming matt outward and forward, interfrontalia 4–5 times width of a parafrontale at middle, slightly narrowed to extremities, parafrontalia with 3–4 and 1–2 interspersed

small inclinate setae, on outer exterior part with conspicuous black setulae, ocellars and verticals very strong; parafacialia about half, jowls in male almost twice, in female less than one-and-a-half times, width of third antennal segment, the latter not quite reaching mouth-margin; arista long-plumose to apical fourth, longest rays as long as width of third antennal segment; palpi in male fuscous, of normal shape, in female fuscous-black, reaching crossing point of vibrissae and fully as wide as antennae. *Thorax* with rather narrow vittae, the paramedian ones broader behind suture; 0+1 *acr*, 2+3 strong *dc*, 2 strong *ia*, anterior one in female slightly behind first *post dc*, in male half-way between levels of this and *sa*, *pra* more than twice as long as second *npl* and a little shorter than first *post dc*; auxiliary prostigmal in female weak or hair-like, in male well developed, anterior mesopleural well developed, 1+2 strong *stpl*. *Abdomen* short-ovate, very thinly dusted with a faint narrow suffused median vitta, in posterior view disc largely shining brassy-brown and the dust mainly visible

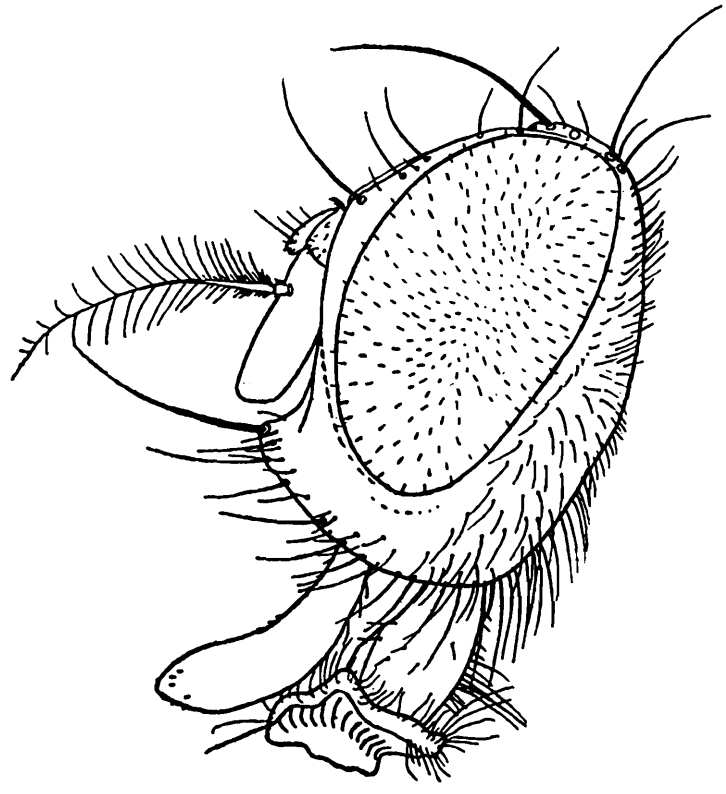


FIG. 76. *Phaonia magnipalpis* sp. n., head of female.

at sides, in a more lateral view the dust in the female more extended and interrupted by some shifting dark spots; setiae as in *apicefemoralis*. *Wings* subhyaline with a brownish tinge, membrane evenly haired; veins dark brown, without

setulae, *r-m* and *m-m*, and to a lesser extent longitudinal veins, suffused in female, r_{4+5} somewhat sinuous at apex, *m* in male virtually straight or even gradually and very slightly curved backward, in female very distinctly upcurved to apex; *m-m* conspicuously concave or sinuous, in female moderately, in male strongly, oblique. Calyptrae pale yellowish-grey with whitish, sometimes slightly ochraceous, border and whitish fringe. Halteres in male pale reddish-yellow, in female dull reddish, considerably infuscated. *Legs* moderately slender, fore tibia in male without, in female with, 1(–2) strong, submedian setae; mid femur with about 5 erect *v* setae on basal half, mid tibia with 2–3 *p* setae; hind femur with a dense *ad* row, with or without a few weak *av* setae in basal half and with four or more strong *av* in apical half, hind tibia with 2 *ad* and 3–4 *av* setae.

Length.—5·4–6·5 mm., of wings 5·3–6·6 mm.

Distribution.—N.E. BURMA: Kambaiti, 2,000 m., 7.V.34 (*R. Malaise*), ♂ type (Mus. Stockholm), 8.IV–4.VI.34, 11 ♂ 10 ♀ paratypes (Mus. Stockholm, B.M. and Mus. Helsinki). S. INDIA: Kodaikanal, 23.III.36. (B.M.-Colombo Mus. Exp. 1936), 1 ♀.

The Kodaikanal female differs by pale coxae, straight *m* and slightly longer rays of the arista and may prove to belong to a distinct subspecies.

113. **Phaonia simulans** Malloch.

1931. ! *Phaonia simulans* Mall., *Ann. Mag. n. H.* (10), VII, 189.
♂ ♀ Types: Fraser's Hill. B.M.

♂ ♀: Fuscous with pale testaceous postalar callosities, scutellum, trochanters, femora, tibiae, and usually shoulders, rather densely dusted grey, the four thoracic vittae in male and some females less densely dusted and not so conspicuous. *Head* densely dusted pale grey; eyes rather densely short-haired, in male closely contiguous, interfrontalia visible as a triangular area in anterior third, otherwise obsolete, parafrontalia obsolete or almost so in upper half, narrow anteriorly where 2–3 strong and a few small inclinate setae are present, ocellars well developed, verticals fine, sometimes not clearly differentiated; eyes in female separated by about a quarter (0·23–0·28) head-width at vertex and by a third to two-fifths head-width at lunula, frontal triangle grey-dusted, fading out between middle and anterior eighth of frons, interfrontalia somewhat widened to middle, where they are 4–5 times the

width of a parafrontale, very slightly narrowed from there to anterior end, parafrontalia with 3–5 strong and, interspersed between them, a few small, inclinate setae, outer part with 1–2 rows of black proclinate setulae, ocellars and verticals strong; parafacialia half (♂) or more than half (♀), jowls twice (♂) or one-and-a-half times (♀) width of third antennal segment. Arista long-plumose with subequal rays to apical fourth, longest rays fully (♂) or almost (♀) twice as long as width of third antennal segment. *Thorax* with rather narrow vittae, the paramedian ones widely separated and very close to the *dc*; 0+1 strong *acr*, 2+4 strong *dc*, 2 strong *ia*, the anterior one half-way between levels of first and second *post dc*, *pra* and second *npl* rather strong, the *pra* somewhat shorter than the *ia*; auxiliary prostigmal rather strong, anterior mesopleural sometimes indistinct, 1+2 strong *stpl*. *Abdomen* subcircular to short-ovate, in male rather densely and evenly, in female less conspicuously, grey-dusted, with a very narrow undusted median vitta, in female the lateral parts of disc more or less largely glossy in posterior view; setae as in *rectinervis*. *Wings* subhyaline with a slight ochraceous tinge, membrane evenly haired, veins testaceous to brown, without setulae; *r-m* and *m* not darkened, *m-m* conspicuously oblique and sinuous, R_5 rather broad at apex with r_{4+5} markedly sinuous and *m* virtually straight. Calyptrae pale yellowish subopaque with concolorous border and pale golden fringe. Halteres pale reddish-yellow. *Legs* with more or less infuscated coxae and with piceous-brown tarsi, fore tibia without a submedian *p* seta; mid femur with 1–3 erect *v* setae on less than basal half, mid tibia with 2–3 *p* setae; hind femur with a dense *ad* row, with small and inconspicuous *av* setae on less than basal half and 3–5 strong ones near apex, hind tibia with 2 *ad* and 2–3 *av* setae.

Length.—4·7–7·6 mm., of wings 5·3–8·5 mm.

Distribution.—MALAYA: Fraser's Hill, 4,000 ft. and 4,200 ft., Pahang; Cameron Highlands, 4,800 ft., Pahang. N.E. BURMA: Kambaiti, 7,000 ft. N. INDIA: Simla, 7,000 ft. (a large male with more conspicuous vittae on thorax).

In the type and paratype the dark thoracic vittae are very faint, but in other females from Fraser's Hill they are quite as conspicuous as in the series from Kambaiti. The colouration of the shoulders is also rather variable (but is not correlated to the development of the vittae). The *pra* is, as a rule, somewhat longer than the second *npl* but may be equal or even slightly shorter.

114. **Phaonia kashmirensis** Malloch.

1921. ! *Phaonia kashmirensis* Mall., *Ann. Mag. n. H.* (9), **VIII**, 416. ♀ Type: Gulmarg. B.M.

♀ : Fuscous with the tibiae and hind femora pale ferruginous, rather densely dusted whitish-grey with 4 (6) fuscous-black thoracic vittae and shifting dark abdominal spots. *Head* densely dusted silver-grey, eyes conspicuously haired (hairs longer than greatest diameter of arista), frons at vertex three-tenths, at lunula two-fifths, head-width, frontal triangle with some grey dust, rather indistinctly prolonged to lunula, interfrontalia slightly and evenly narrowed to vertex, more suddenly and somewhat more strongly to lunula, four times as wide at middle as a parafrontale, the latter with 6 strong inclinate setae, on outer part with 2–3 rows of proclinate black setulae, ocellars and verticals strong; parafacialia somewhat wider than, jowls almost thrice as wide as, third antennal segment, the latter falling short of mouth-margin by almost its own width; rays of arista evenly decreasing in length from middle onwards, longest rays half as long again as width of third antennal segment. *Thorax* with moderately broad fuscous-black vittae, paramedian ones well separated from the *dc*, outer ones very incomplete and divided behind suture by a broad vitta of whitish-grey dust on the *ia* strip; 0+2 strong *acr*, 2+4 strong *dc*, 2 strong *ia*, the anterior one slightly in front of level of second *post dc*, *pra* fully twice as long as second *npl* and fully as long as anterior *ia*; auxiliary prostigmal strong, anterior mesopleural well developed. *Abdomen* subcircular with pointed apex, moderately densely dusted yellowish-grey with a narrow suffused undusted median vitta and in posterior view a shifting transverse spot on lateral part of base and an oblong smaller one on each side of disc of intermediate segments, setae as in *rectinervis*. *Wings* subhyaline, membrane evenly haired, veins brown, without setulae; r_{4+5} very shallowly sinuous towards tip, apical sector of *m* almost inappreciably sinuous; *m-m* strongly sinuous and rather oblique. Calyptrae whitish with creamy-white border and fringe. *Legs* with fuscous-brown anterior femora, the extreme tip of which is pale testaceous, and with pale hind femora which are suffusedly browned dorsally on apical third; fore tibia without a submedian seta; mid femur with 4 strong erect *v* setae on basal half and a smaller, less erect one a little beyond, mid tibia with 2 *p* setae; hind femur with a dense *ad* row and 7 strong *av* setae from basal fourth to apex (5 of them on apical half), hind tibia with 2 strong *ad* and 3 weak *av* setae.

Length.—8·0 mm., of wings 8·0 mm.
Distribution.—INDIA: Kashmir, Gulmarg, 8,500 ft.

115. **Phaonia auricoxa** sp. n.

♂ ♀: Fuscous with moderately dense and uniform brownish-grey and, in some places, bluish-grey to greenish-grey dust, thoracic vittae only slightly less dusted, legs yellowish-orange with brown tarsi. *Head* rather densely dusted brownish-grey; eyes rather conspicuously short-haired, the hair in male somewhat longer where the eyes are almost contiguous, interfrontalia perfectly linear above middle, forming a very small elongate triangle in front of ocelli and a moderately large elongate triangle in lower half, parafrontalia with 5–6 erect inclinate setae, most of which are small, in less than anterior half, and six proclinate setulae from there almost to level of anterior ocellus, ocellars rather strong, verticals very fine and not very clearly differentiated; eyes of female separated at vertex by almost a quarter, at lunula by slightly more than a third, head-width, frontal triangle poorly defined, somewhat grey-dusted, very elongate, fading out towards lunula, interfrontalia very slightly broadened forward, four times as wide at middle as a parafrontale, the latter with 3 inclinate setae, which alternate with 3 inclinate setulae, and on outer part a rather regular row of proclinate black setulae, ocellars and verticals strong; parafacialia a third the width of, jowls half again as wide as, third antennal segment, the latter reaching mouth-margin, arista short-plumose, hairs slowly decreasing in length from middle or two-thirds onwards, the longest almost as long as width of third antennal segment. Palpi fuscous-brown. *Thorax* with four rather narrow vittae of an olivaceous tinge, the paramedian ones well separated from the *dc*, the outer ones interrupted at suture, almost complete behind suture, not really divided but an outer arm somewhat indicated; 0+1 *acr*, 2+4 strong *dc*, 2 strong *ia*, *pra* only slightly shorter than the anterior *post dc* and *ia*, at least equal to the second *npl*; auxiliary prostigmal weak or moderately strong, anterior mesopleural distinct. *Abdomen* quite evenly dusted with a narrow faint darker median vitta; setae as in *rectinervis*. *Wings* subhyaline, somewhat orange at base, membrane evenly haired, veins brown with ochraceous bases, without setulae; R_5 distinctly narrowed towards apex, r_{4+5} somewhat curved back and sinuous, *m* very slightly upcurved at tip; *m-m* moderately oblique and somewhat sinuous. Calyptrae opaque, strongly ochraceous, with concolorous

border and fringe. Halteres pale reddish-yellow. *Legs* rather bright yellowish-orange, the *v* hairs of the fore tibia in female of the same colour; fore tibia without a *p* seta; mid femur with 2–4 not very strong erect *v* setae on basal third to half, mid tibia with 2 strong *p* setae; hind femur with a dense *ad* row and on apical third with 2–3 strong *av* setae, which are preceded by 1–2 small ones, hind tibia with 2 *ad* and 2 weak *av* setae.

Length.—5·4–6·4 mm., of wings 5·5–6·8 mm.

Distribution.—S. INDIA: Shembaganur nr. Kodaikanal, 6,000 ft., 30.IV.36 (B.M.-Colombo Mus. Exped. to S. India, 1936) ♀ type (B.M.). CEYLON: Pidrutalagala, C.P., 2,000–2,460 m., 19.IX.53 (*F. Keiser*), 1 ♂ paratype (Mus. Basle); Nuwara Eliya, One-Tree Hill, 1,900 m., 21.XI.53 (*F. Keiser*), 1 ♀ paratype (B.M.).

116. **Phaonia acerba** Stein.

1918. ! *Phaonia acerba* Stein, *Ann. Mus. nat. Hungar.*, **XVI**, 166. ♀ Type: Darjeeling. B.M., paratype Mus. Berlin.

♂ ♀: Fuscous-black, rather shining, dorsum with some brassy reflections, especially in male, with some pale grey dust and 4 (6) suffused undusted thoracic vittae, the paramedian ones tending to fuse, legs pale testaceous with piceous tarsi. *Head* moderately densely dusted grey, anterior part of jowls with brownish dust, parafacialia with a dark spot at level of second antennal segment; eyes conspicuously but not very densely long-haired in male, short-haired in female; eyes of male contiguous with markedly larger facets above, interfrontalia obsolete in upper half, rather broadly triangular below, parafrontalia obsolete to linear in upper half, moderately dilated below where 3–4 long and strong inclinate setae and, alternating with them, a few small ones are present, ocellars long and moderately strong, verticals very fine and not very distinctly differentiated; eyes of female separated at vertex by three-tenths head-width, at lunula by two-fifths, frontal triangle small but more or less distinctly sending a linear extension to lunula, interfrontalia slightly dilated to beyond middle and somewhat narrowed at anterior end, 4–5 times as wide at middle as a parafrontale, the latter with 4–5 strong inclinate setae interspersed with a few small ones, the outer part with an irregular row of proclinate black setulae, ocellars and verticals strong; parafacialia almost, jowls 2½–3 times, as wide as third antennal segment, the latter falling short of

the, slightly produced, mouth-margin by fully, and of level of vibrissae by about half, its own width; arista long-plumose, the rays becoming quickly shorter only on apical fifth, longest ones more than half as long again as width of third antennal segment. *Thorax* with the pale dust on dorsal surface reduced to not much more than shoulder region and a pair of narrow vittae on the line of the *dc*; 0+1 strong *acr*, 2+4 strong *dc*, 2 strong *ia*, the anterior one half-way between the first two *post dc*, *pra* almost as long as the anterior *ia* and almost twice as long as second *npl*; auxiliary prostigmal strong (sometimes quite a group of strong setae present), anterior mesopleural variable. *Abdomen* short-ovate, with a faint darker median vitta and usually narrow slightly darkened hind margins; setae as in *rectinervis* but rather long and not very strong. *Wings* subhyaline with a slight brownish tinge, the base somewhat orange, membrane evenly haired, veins brown with ochraceous bases, without setulae; r_{4+5} distinctly sinuous, *m* very slightly upcurved in apical sector, almost straight, R_5 not, or only slightly, narrowed towards apex, *m-m* moderately sinuous and concave. Calyptrae subhyaline or subopaque, ochraceous or whitish-ochraceous, with concolorous border and fringe. Halteres dull reddish-yellow. *Legs* moderately slender, fore tibia with a *p* seta; mid femur with 3–5 not very strong erect *pv* setae on about basal half, mid tibia with 3–4 *pd* and 1–2 *p* setae; hind femur with a dense *ad* row and a complete *av* row of which, however, only the distal 3 setae are strong, hind tibia with 1(–4) *ad* and 3–4 *av* setae.

Length.—4·6–7·0 mm., of wings 5·8–7·4 mm.

Distribution.—INDIA: Darjeeling. N.E. BURMA: Kambaiti, 2,000 m. (*R. Malaise*), 2 ♂ 2 ♀

One of the *ad* setae near middle of hind tibia is stronger, and the most proximal 1–2, when present, are small. The variation in the number of these setae is not geographical, since 4 *ad* setae are present in the type and in a male from Kambaiti. One female from the latter locality (with one *pd* on the hind tibia) has only two setae on the *p* surfaces of the mid tibia.

There is in the Zoological Survey of India a single female from Phagu, Simla Hills, 9,000 ft., 18–21.V.16 (*Annandale* and *Kemp*), which has piceous-brown legs, only 4–5 *p* setae on the mid tibia and somewhat wider jowls. It differs from the European *P. incana* only by much thinner pollinosity of the abdomen and may indicate that *acerba* is only a subspecies of *incana*.

117. **Phaonia curviseta** sp. n.

(Fig. 77)

♀: Fuscous, densely dusted pale grey, mesonotum with the dust somewhat brownish near median line and with four very sharply defined fuscous vittae, which in certain directions appear overlaid with brown dust; apex of scutellum translucent pale ferruginous; abdomen with a suffused dark median vitta and large transverse shifting spots; proximal antennal segments ferruginous with darker disc, legs with pale ferruginous fore tibia and posterior femora and tibiae, *av* and *pv* surfaces of posterior femora with a dark brown streak on apical part. *Head* densely dusted pale grey, interfrontalia and bare part of jowls brown dusted, parafacialia with some brown dust and a transverse shifting dark spot at level of arista, in certain views with another similar spot just above it; eyes densely long-haired; frons at vertex two-fifths (0·39) head-width, conspicuously widened with straight sides to lunula where it is one-half head-width, frontal triangle small, dusted brownish, with a suffused linear forward extension towards lunula, interfrontalia gradually narrowed towards hind end and suddenly narrowed anteriorly, almost thrice as wide at widest part (anterior third) as a parafrontale, the latter on anterior two-thirds with 5 strong inclinate setae and to their outer side rather numerous inclinate and, further outward, proclinate black hairs, outer verticals strong, ocellars and inner verticals very strong; parafacialia broadly visible in lateral view, jowls just above anterior half of peristomal row with 3–4 somewhat weaker upcurved setae. Third antennal segment falling short of mouth-margin by half its own width; arista plumose, rays gradually becoming shorter from middle onwards. *Thorax* with rather fine erect hairs, the *prst acr* hairs in about 10 irregular longitudinal rows, notopleura haired, *pra* twice as long as second *npl*, level with first *prst dc*, anterior *ia* half-way between levels of anterior two *post dc*; auxiliary prostigmal strong, anterior mesopleural conspicuous. *Abdomen* very short-ovate, first segment with distinct lateral marginals, second with distinct lateral discals and a marginal row, the setae of which become weaker and more widely spaced near middle, third with a row of strong marginals and discals (the latter weaker near middle), fourth with a row of strong discals and rather weak marginals. *Wings* greyish subhyaline with brown veins; r_1 distinctly exceeding level of *r-m*, which is somewhat suffused and lies slightly beyond middle of discal cell; r_{4+5} and *m* very slightly diverging (always?) at extreme tip, r_{4+5} just

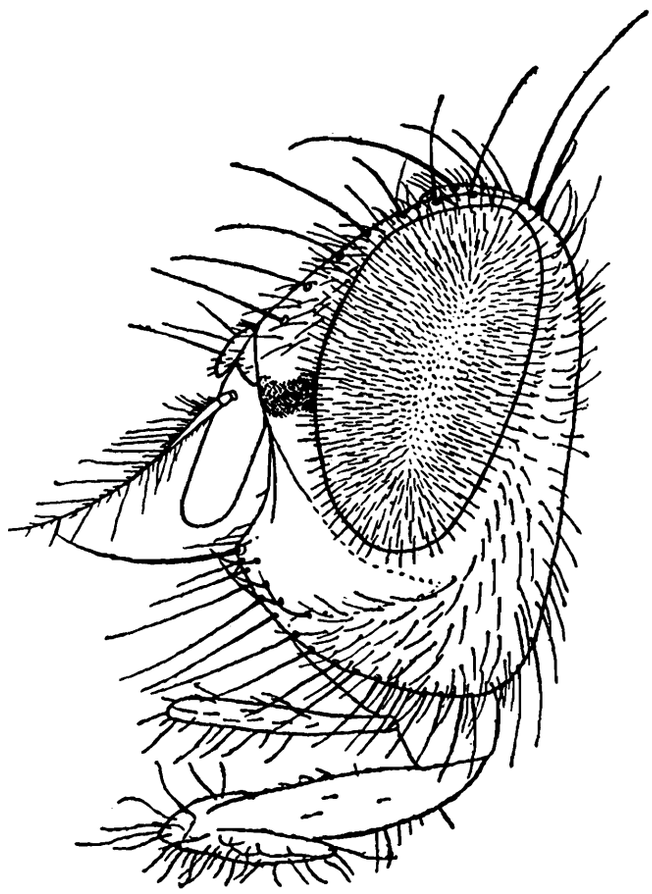


FIG. 77. *Phaonia curviseta* sp. n., head of female type.

noticeably sinuous, *m* almost inappreciably curved backward, *m-m* somewhat oblique and sinuous, slightly suffused. Lower calyptra greyish subopaque with ochraceous border and whitish fringe. Halteres pale reddish-yellow. *Legs* moderately slender; fore tibia with 1 (2) *p* setae; mid femur with 5–6 *pv* setae on basal half, which are about as long as width of femur, mid tibia with 3 *p* setae and a very small *pd*; hind femur with a complete row of *av* setae, of which 4–5 near apex and 1–2 near middle are strong, hind tibia with 3 *ad* and 3 *av* setae and with some half-erect *a* setulae.

Length.—7·3 mm., of wing 7·5 mm.

Distribution.—N. INDIA: Phagu, 9,000 ft., Simla Hills, 11.V.09 (*N. Annandale*), ♀ type (in Zoological Survey of India, Calcutta).

The mesothorax of the type is broken, and nothing can be stated about the *prsc*. The first two *post dc* are preserved on the right side and show that they are so closely spaced that four must have been present. The left wing is missing and the right one somewhat damaged.

118. **Phaonia interfrontalis** sp. n.

♂ ♀: Fuscous-black with brassy reflections on dorsum, scutellum with a pale ferruginous spot on margin to the outer side of the apical setae, dust brown on middle of dorsum, especially in male, otherwise whitish-grey, the 4 (6) dark thoracic vittae less conspicuous in male; abdomen with shifting spots. *Head* rather densely dusted grey, parafacialia with a conspicuous dark spot below level of lunula; eyes of male densely long-haired, subcontiguous, separated by about $\frac{1}{20}$ head-width, frons slightly dilated to vertex but strongly to lunula, interfrontalia very narrow and almost parallel-sided above, triangular below, parafrontalia linear in upper, strongly dilated in lower half, on the latter with about 6 rather strong and 3–4 weak setae, some of which are interspersed between the strong ones, upper half with 4–5 inclinate setulae, ocellars rather strong, verticals very fine and not very distinct; eyes of female with rather long, though not very dense hair, frons almost three-tenths head-width at vertex, almost two-fifths at lunula, frontal triangle hardly exceeding middle, interfrontalia with a pair of small cruciate setae, 4–5 times as wide at middle as a parafrontale, the latter with 4(–5) strong inclinate setae, and with rather strong proclinate black setulae on outer part, ocellars and verticals strong; parafacialia over half, jowls one-and-a-half times, width of third antennal segment, the latter reaching mouth-margin; rays of arista evenly decreasing in length from middle onwards, longest rays in male slightly longer, in female markedly shorter, than width of third antennal segment. *Thorax* with moderately broad vittae, the outer ones interrupted at suture and divided into two behind suture by pale dust; posterior *prst acr* in front of level of posterior *prst dc*, the *acr* moderately strong, 2+4 strong *dc*, 2 strong *ia*, the anterior one like the first *post acr* about half-way between first and second *post dc*; *pra* about as strong as second *npl*; auxiliary prostigmal and anterior mesopleural well developed. *Abdomen* ovate, intermediate segments in posterior view with a narrow black median vitta, a large broadly triangular dusted area extending along the whole hind margin of the intermediate segments and largely brassy-brown on disc and dark anterior angles, fourth segment similar, but the dusted spot not triangular, the dark basal spot on each side occupies somewhat more than half the length of the segments; setae as in *rectinervis*. *Wings* greyish subhyaline with brown veins, *r-m* markedly, and *m-m* slightly, suffused; membrane evenly haired, veins without setulae; *2C* rather broadened, r_1 reaching level of *r-m*, which

lies at almost three-fifths of discal cell, R_5 not narrowed at apex, r_{4+5} markedly sinuous, *m* almost straight, very slightly curved back, *m-m* sinuous, moderately oblique. Calyptrae greyish-white with concolorous border and fringe. Halteres dull reddish-yellow. *Legs* fuscous, moderately slender; mid femur with 6–8 *pv* setae on slightly more than basal half, mid tibia with 2–3 *p* setae; hind femur with a dense *ad* row, a rather widely spaced row of short but quite strong *av* setae, and 4–6 rather fine *pv* setae on basal half, hind tibia with 2 *ad* and (1–)2(–3) *av* setae.

Length.—5·9–6·7 mm., of wings 5·8–6·9 mm.

Distribution.—E. BURMA: Kambaiti, 2,000 m., 8.IV.34 (*R. Malaise*), ♂ type, 1 ♂ 1 ♀ paratypes, 6.IV, 1 ♀ paratype (type and 1 ♀ paratype in Mus. Stockholm, 1 ♂ 1 ♀ paratype in B.M., 1 ♂ paratype in Mus. Helsinki). N. INDIA: Theog, 8,000 ft., Simla Hills, 2.V.07 (*N. Annandale*), 2 ♀ paratypes; Simla, 7,000 ft., 10.V.09 (*Annandale*), 1 ♀ paratype (in Zoological Survey of India, Calcutta, and B.M.). PAKISTAN: N.W. Himalayas, 1951 (*M. A. A. Qadri*), 2 ♀ paratypes (returned to collector).

119. **Phaonia atkinsoni** sp. n.

♀: Fuscous-brown (but specimen somewhat teneral) with rather dense whitish-grey dust; mesonotum with 4 narrow fuscous vittae, behind suture in addition a short broader vitta between the anterior *ia* and the *pra* and *sa*; abdomen rather densely dusted whitish-grey with an undusted median vitta, which is rather broad anteriorly but very narrow behind. *Head* densely dusted pale yellowish-grey, parafacialia with a large contrasting shifting dark spot at and below level of second antennal segment; eyes short-haired (♀), separated at vertex by almost one-third (0·32) head-width, frons moderately dilated with straight sides to lunula, where it is two-fifths (0·41) head-width, frontal triangle recognizable only as a slightly shining area, reaching middle, thinly pale dusted like interfrontalia, which are conspicuously narrowed anteriorly and 3–4 times as wide at middle as a parafrontale; the latter with 4–5 inclinate setae on anterior two-fifths and a few proclinate setulae arranged in a longitudinal row to their outer side, ocellars rather strong, verticals strong; parafacialia less than half, jowls less than twice, as wide as third antennal segment, the latter falling short of mouth-margin by less than half its own width; arista long-plumose, rays quickly decreasing in length on apical third, longest rays slightly longer than width of third antennal segment. *Thorax* with

some brown dust on median line from the *prsc* to the hindmost *prst acr* and along margins of vittae, anterior two *post acr* rather weak, 2+4 strong *dc*, 2 strong *ia*, the anterior one at level of second *post dc*, a third smaller but quite conspicuous *ia* (always ?) present slightly behind level of first *post dc*, *pra* hardly weaker than second *npl*; anterior mesopleural well developed. *Abdomen* with slight shifting reflections on disc, second and third segments each at base of lateral surface with a well-defined but shifting small dark spot; first segment with some lateral marginals, second with lateral discals and a row of marginals, which are rather weak except laterally, third and fourth with a row of moderately strong discals and marginals. *Wings* greyish subhyaline with brown veins, *r-m* markedly, and *m-m* slightly, suffused, membrane evenly haired, veins without setulae; r_1 reaching level of *r-m*, which lies at almost three-fifths of discal cell; R_5 hardly dilated at tip, r_{4+5} markedly sinuous, *m* very gently curved back, *m-m* sinuous, hardly oblique. Calyptrae whitish with concolorous border and fringe. Halteres pale reddish-yellow. *Legs* piceous-brown with light brown tibiae and trochanters (but type somewhat teneral); mid femur with a fine erect *pv* seta at base, mid tibia with 2 *p* setae; hind femur with a dense *ad* row and 4–5 rather strong *av* setae on apical third or half, hind tibia with 1 *av* and 1–2 *ad* setae.

Length.—6·0 mm., of wings 6·2 mm.

Distribution.—BURMA: Maymyo, Mandalay Dist., 7.IX.29 ex *Quercus griffithi* (*D. J Atkinson*), ♀ type (in B.M.).

120. **Phaonia coeruleicolor** Stein.

1910. *Phaonia coeruleicolor* Stein, *Ann. Mag. nat. Hungar.*, **VIII**, 545 ♀ Type: Pattipola. Mus. Budapest.

Head: Eyes elongate and narrow, bare, separated by a vitta which above the antennae is narrower than an eye; interfrontalia black, deeply but narrowly excised behind, the excision (= frontal triangle), the narrow parafrontalia and the remaining parts of the head with pale bluish-grey dust; frons and parafacialia not projecting, jowls narrow. Antennae rather long, black with distinctly plumose arista. Palpi black. *Thorax* with thin blue-grey dust, with very narrow obsolete paramedian vittae; 0+1 *acr*, 4 *post dc*, *pra* half the length of *sa*, 1+2 *stpl*, the lower one much shorter. *Abdomen* ovate, coloured like the thorax but hardly greyish-dusted, so that it appears slightly shiny, bare and with rather weak erect setae only on hind margins of last three segments.

Wings strongly smoky, r_{4+5} and *m* slightly diverging; *m-m* oblique and sinuous. Calyptrae of the colour of the wings. Halteres even somewhat darker. *Legs* yellow, tarsi black; fore tibia without a seta, mid tibia with 2 *p* setae, hind tibia with 2 *av* and 2 *ad* setae (ex Stein).

Distribution.—CEYLON: Pattipola.

121. **Phaonia fuscicoxa** sp. n.

♂ ♀: Fuscous with moderately thin grey dust which on middle of dorsum becomes purplish-brown and in places bluish, the 4 (6) dark thoracic vittae moderately narrow, suffused behind suture, abdomen wholly and evenly dusted except for a narrow undusted median vitta; legs dark with pale testaceous femora and tibiae. *Head* rather densely dusted silver-grey and brownish-grey, parafacialia of female with a very small dark spot on inner margin at level of second antennal segment; eyes in male densely long-haired, contiguous or practically so, interfrontalia often just visible as a complete black line, narrowly triangular in front, parafrontalia linear on more than upper half, somewhat dilated to lunula, smaller lower half with 3–4 strong inclinate setae, which alternate with much weaker ones, upper half with small inclinate setulose hairs, ocellars long and moderately strong, verticals very fine but long and very distinct; eyes of female thinly short-haired, separated at vertex by almost a third (0·30–0·33) and at lunula by two-fifths head-width, frontal triangle somewhat shining, reaching at least anterior third of frons, interfrontalia somewhat narrowed at extremities, fully four times as wide at middle as a parafrontale, the latter with 3–4 strong inclinate setae, and on outer part with a few sparse proclinate black setulae, ocellars and verticals strong; parafacialia more than half, jowls in male almost thrice, in female twice, width of third antennal segment, the latter not quite reaching mouth-margin, longest rays of arista situated at middle, slightly longer than width of third antennal segment, hairs becoming slowly shorter to both ends. *Thorax* with the dark dust turning purplish-brown on disc and the pale dust appearing pale greyish-blue in certain directions; 0+1 strong *acr*, 2+4 strong *dc*, 2 strong *ia*, the anterior one before level of second *post dc*, *pra* almost or fully twice as long as second *npl*; auxiliary prostigmal as a rule well developed, anterior mesopleural variable. *Abdomen* short-ovate, with a conspicuous narrow dark median vitta and dust which appears pale bluish in certain directions, the anterior part of the segment being of this colour if viewed from behind; setae as in *rectinervis*.

Wings subhyaline, somewhat ochraceous, especially at base, membrane evenly haired; veins light brown, without setulae; r_{4+5} somewhat sinuous at apex, *m* almost straight, R_5 not or slightly narrowed at apex; *r-m* rather strongly sinuous and oblique. Calyptrae yellowish-grey, subopaque, with pale ochraceous border and fringe. Halteres pale reddish-yellow. *Legs* with infuscated coxae and trochanters (at least in male) and piceous tarsi; fore tibia without a *p* seta; mid femur with 4–5 strong erect *v* setae on basal half, mid tibia with 2–3 strong *p* setae; hind femur with a dense row of *ad* setae and in male short *av* on basal half and strong ones on apical half, in female with subequal *av* from base to apex, in male in addition with one *pv* seta beyond middle, in female with a complete row of *pv*, which are widely spaced on basal half and more closely set near apex, hind tibia with 1 (♀) –2 (♂) *ad* and 3–4 *av* setae.

Length.—5·2–7·5 mm., of wings 5·6–7·7 mm.

Distribution.—N.E. BURMA: Kambaiti, 2,000 m., 23.V.34 (*R. Malaise*), ♂ type; 7.V, 25.V and 12–17.VI.34, 3 ♂ paratypes; 1.V.34, 1 ♀ paratype (type and ♀ paratype in Mus. Stockholm, ♂ paratypes in B.M. and Mus. Helsinki).

122. **Phaonia debilis** Stein.

1918. !*Phaonia debilis* Stein, *Ann. Mus. nat. Hungar.*, **XVI**, 167 ♂ ♀. Types: Mussoorie. B.M.

♂ ♀: Fuscous with rather dense grey dust, which becomes greyish-brown on middle of dorsum, with 4 (6) thoracic vittae and a vestigial abdominal median vitta; legs pale, testaceous with piceous tarsi; basal antennal segments testaceous with browned discs. *Head* rather densely dusted silver-grey and brownish-grey, parafrontalia of female with a dark spot at level of second antennal segment; eyes densely long-haired in male, contiguous, the interfrontalia obsolete on more than upper half and forming a rather small triangle below, parafrontalia linear above, somewhat dilated below, with 3–4 moderately strong inclinate setae and a few much smaller ones in part alternating with the strong setae, bare on more than upper half, ocellars strong, verticals small but rather distinct; eyes of female rather densely short-haired, separated at vertex by fully a third (0·33–0·36) and at lunula by about two-fifths (0·38–0·42) head-width, frontal triangle with some brown-grey dust, poorly defined and indistinctly exceeding middle, interfrontalia slightly narrowed at both ends, 4–5 times as wide at middle as a parafrontale, the latter with 3–4

strong and, alternating with them, 2–3 small, inclinate setae, outer part with a rather regular row of proclinate black setulae, ocellars and verticals strong; parafacialia more than half, jowls in male thrice, in female twice, as wide as third antennal segment, the latter falling short of mouth-margin by half its width; rays of arista becoming progressively shorter on apical third. *Thorax* with somewhat suffused, moderately narrow, rather shifting vittae; 0+1 strong *acr*, 2+4 strong *dc*, 2 strong *ia*, the anterior one half-way between first and second *post dc*, *pra* almost as strong as the latter and nearly twice as long as second *npl*; auxiliary prostigmal and anterior mesopleural well developed. *Abdomen* very short-ovate, in female pointed, very evenly dusted brownish-grey, on disc more greyish-brown, especially in male, with only a vestige of a median vitta on the second and sometimes third segments when viewed from behind; setae of male as in *rectinervis*, of female indistinct. *Wings* subhyaline with a strong ochraceous tinge, membrane evenly haired, veins light brown, without setulae; R_5 not or hardly narrowed before apex, r_{4+5} somewhat sinuous, *m* straight; *m-m* only slightly concave and oblique. Calyptrae greyish subhyaline with yellowish-white border and pale golden fringe. Halteres pale, yellowish to pale reddish-yellow. *Legs* moderately slender, fore tibia without a submedian seta; mid femur with 1–2 erect *pv* setae near base, mid tibia with 2–3 *p* setae; hind femur with a dense *ad* row and, on apical half or less, a rather dense row of short *av* setae which in female and in some males is reduced to 3–4 strong setae near apex, hind tibia with a strong *ad* seta at middle and 2–3 small *av*, in male in addition with an irregular row of half-erect *a* setulae and at and beyond middle a short one of *p* setulae.

Length.—5·2–7·2 mm., of wings 5·6–7·5 mm.

Distribution.—INDIA: Mussoorie, 7,000 ft. The male in the B.M. is herewith selected as the type, 1 ♂ and 3 ♀ having apparently been kept in Stein's collection, and 4 ♀ paratypes being in B.M.; Kumaon; Darjeeling; Kurseong, E. Himalayas, 5,000 ft. N.E. BURMA: Kambaiti, 2,000 m. MALAYA: Fraser's Hill, 4,000 ft., Pahang.

123. **Phaonia seriesetosa** sp. n.

♂ ♀: Fuscous with moderately thick brownish-grey and bluish-grey dust and four moderately broad thoracic vittae, abdomen with shifting dark spots; proximal antennal segments testaceous with browned disc, legs pale, testaceous with the coxae more or less darkened and the tarsi piceous. *Head*

rather densely dusted brownish-grey, in places bluish-grey; eyes of male rather densely long-haired, contiguous, interfrontalia obsolete in upper half, rather narrowly triangular in lower half, parafrontalia linear, slightly broadened to lunula, anterior smaller half with 3–4 strong inclinate setae, which alternate with much weaker ones, posterior half with about 4–5 setulose hairs, which almost reach anterior ocellus, ocellars rather strong, verticals fine and long, but 1–2 of the adjacent occipital setulae only slightly shorter; eyes of female with moderately dense and short hairs, separated at vertex by almost three-tenths (0·28) and at lunula by more than a third (0·36) head-width, frontal triangle slightly shining, exceeding middle, apex produced to lunula, interfrontalia markedly narrowed behind and slightly narrowed in front, at middle fully four times width of a parafrontale, the latter with 3 strong and 1–2 weak inclinate setae, ocellars and verticals strong; parafacialia one-half, jowls almost thrice (♂) or almost twice (♀) width of third antennal segment, the latter falling short of mouth-margin by more (♂) or less (♀) than half its own length; rays of arista subequal up to almost apical third, from where they slowly decrease in length, longest rays slightly longer than width of third antennal segment. Palpi dull reddish-orange with infuscated apical fourth or third. *Thorax* with rather clearly defined dark vittae, which are well separated from the *dc* and from each other, though the ensuing vittae of pale dust are rather narrow behind, the dark vittae tending to be narrowly connected at suture, and the paramedian ones in posterior view approaching scutellum; 0+1 strong *acr*, 2+4 strong *dc*, 2 strong *ia*, the anterior one slightly in front of level of second *post dc*, *pra* slightly shorter than anterior *post dc* and *ia* but much more than twice length of second *npl*; auxiliary prostigmal indistinct or weak, anterior mesopleural very distinct. *Abdomen* subcircular in outline in male, short-ovate in female, moderately thickly greyish-dusted, in posterior view in male with irregular, confluent shining dots which on the anterior segments almost annihilate all traces of pale dust, whilst on the posterior segments the pale dust prevails except on a moderately broad median vitta and small irregular spots and dots; in female the pale and dark spots larger and more even, a narrow median vitta and large lateral spots on the basal half of the segments being dark; setae as in *rectinervis*. *Wings* subhyaline with a slight ochraceous tinge in front and at base, membrane evenly haired; veins light brown with paler base, devoid of setulae; r_{4+5} rather markedly *m* slightly sinuous towards apex, these veins thus somewhat converging

before, but distinctly diverging at apex (in female r_{4+5} not markedly sinuous at apex and *m* very slightly upcurved, the veins thus slightly converging), *m-m* rather upright, slightly concave. Calyptrae subopaque, pale ochraceous, with pale yellowish border and fringe. Halteres pale reddish-yellow. *Legs*: Fore tibia without a *p* submedian seta (posterior legs of ♀ paratype missing), mid femur of male with a complete row of longer setulae or fine setae on *av* surface and of strong setae on *pv* surface, the *pv* ones much shorter and finer on apical third, mid tibia with 2(–3) *p* setae; hind femur with complete *ad*, *av* and *pv* rows of rather strong setae, hind tibia with a strong *ad* at middle and 4–5 weak *av* setae.

Length.—5·5–6·0 mm., of wings 5·7–6·5 mm.

Distribution.—N.E. BURMA: Kambaiti, 2,000 m., 1.V.34 (*R. Malaise*), ♂ type (in Mus. Stockholm), 11.V.34, 1 ♂ 1 ♀ paratypes (in B.M. and Mus. Helsinki).

124. **Phaonia triseriata** sp. n.

♂: Fuscous with testaceous translucent underside of scutellum and moderately dense pale grey and brownish dust; with 4 (6) dark thoracic vittae and a speckled shifting abdominal pattern; basal antennal segments pale ferruginous with browned disc, legs pale testaceous with piceous tarsi. *Head* rather densely dusted pale grey; eyes with dense long hairs, contiguous on almost upper two-thirds of frons, where the interfrontalia are obsolete, while they are narrowly triangular below, parafrontalia linear, somewhat broadened in lower two-fifths, where 5 inclinate setae are present of which 2–3 are strong, 2–3 small fine setae interspersed between them, and about 6 setulose hairs on more than upper half of parafrontalia, ocellars strong, verticals long and rather fine, distinct; parafrontalia with a dark spot at level of second antennal segment, one-half, jowls twice, as wide as third antennal segment, the latter almost reaching mouth-margin; arista with the rays becoming only slightly shorter from middle to apical fifth, longest rays about a tenth longer than greatest width of third antennal segment. *Thorax* with the paramedian vittae narrow, suffused behind suture, outer vittae broad, interrupted at suture, divided behind suture by greyish-brown dust along the *ia*; 0+1 strong *acr*, 2+4 strong *dc*, 2 strong *ia*, the anterior one half-way between first and second *post dc*, *pra* almost twice as strong as second *npl*; auxiliary prostigmal strong, anterior mesopleural fine. *Abdomen* subcircular in outline, with an undusted median vitta and numerous undusted dots which coalesce, so that in posterior

view the abdomen appears largely glossy; setae as in *rectinervis*. *Wings* greyish subhyaline with brown and light brown veins; membrane wholly haired; veins without setulae, r_{4+5} and *m* virtually parallel near apex, very gradually and inappreciably curved back, *m-m* oblique and sinuous, the anterior apical angle of the discal cell sharp. Calyptrae subopaque, greyish-white with pale ochraceous border and pale golden fringe. Halteres pale reddish-yellow. *Legs* moderately slender; fore femur with a row of strong *pd* setae, a dense row of strong *av* and between them rather close to the *pd* a third row of about 8 strong *p*, almost *pd*, setae, fore tibia without a submedian seta; mid femur with 5 strong erect *pv* setae on basal half, mid tibia with 2–3 *p* setae, hind femur with a row of dense *ad* setae, 4–5 strong *av* on apical half, continued by a row of weak and small *av* setulae on basal half, and a *pv* seta beyond middle, hind tibia with 2 *ad* and 3–4 weak *av* setae.

Length.—8·5 mm., of wings 9·3 mm.

Distribution.—N.E. BURMA: Kambaiti, 2,000 m., 23.IV.34 (*R. Malaise*), ♂ type (in Mus. Stockholm).

An immature female from Darjeeling, 7,000 ft., 28.V.10 (*Brunetti*) in the Zoological Survey of India appears to belong to this species or a race of it. The dust is greyish-golden, the undusted vittae of the mesonotum broader and more clearly defined, the abdomen with a linear dark median vitta and transverse shifting dark spots, which form almost complete bands. Hind femur without a *pv* seta near middle, hind tibia with only 1 *ad* and 2 fine *av* setae. Otherwise the characters are those of the male type.

Genus 24. **Dendrophaonia** Malloch.

1922. *Dendrophaonia* Mall., *Trans. amer. ent. Soc.*, **XLVIII**, 237.
Genotype: *Spilogaster hilariformis* Stein.

Head with the eyes bare, in male subcontiguous, in female widely separated; inclinate setae in male extending over entire length of frons, last 1–2 distinctly stronger and reclinate, frons of female with a pair of cruciate interfrontal and of proclinate orbital setae; anterior part of jowls with 1–2 upcurved setae, which otherwise are similar to the peristomal setae; arista plumose or short-plumose, longest hairs more than one-third as long as width of third antennal segment. *Thorax* with distinct *acr* setae, several strong *dc* and 2 well-developed *ia*, notopleura bare except for the 2 *npl* setae, *pra* present; scutellum bare on ventral surface but more or

less setulose on lateral surface; prosternum, propleural depression and pteropleura bare; 1+2 *stpl.* *Abdomen* oblong-ovate. *Wings* without setulae on the veins (except costa); *sc* markedly sinuate beyond *h* and strongly bent forward near apex, *m* not upcurved at tip, sixth vein not reaching wing margin and seventh only slightly curved. Lower calyptra well developed, projecting beyond upper one, the inner margin strongly diverging from side margin of scutellum on the entire length. *Legs* without conspicuous secondary sexual characters; front tibia without submedian setae; mid femur with an *a* pre-apical, mid tibia without *ad* or *av* setae; hind coxa bare on posterior surface, hind tibia with a strong *pd* seta between middle and apex.

Distribution.—PALAEARCTIC, NEARCTIC and ORIENTAL REGIONS.

Biology.—Adults on tree trunks. Larvae in strongly decayed wood, birds' nests and the rubbish of hornet nests, also in excrements, presumably predacious.

Only one species is known from the ORIENTAL REGION. It can be recognized by 4 *post dc*, a short *pra*, only moderately long aristal hairs, a rather short third antennal segment, and the *av* surface of the fore femur devoid of an *av* comb.

125. **Dendrophaonia querceti** Bouché.

1834. *Anthomyia querceti* Bouché, *Naturg. Ins.*, **I**, 82. Type: Germany. Lost?
1893. *Spilogaster platyptera* (Zett.) Stein, *Ent. Nachr.*, **XIX**, 216.
1898. *Mydaea platyptera* (Zett.) Villeneuve, *Bull. Soc. ent. France*, 1898, 19.
1907. *Phaonia querceti* (Bouché) Bezzi and Stein, in Becker *et al.*, *Kat. palăarkt. Dipt.*, **III**, 622.
1922. *Dendrophaonia querceti* (Bouché) Malloch, *Trans. amer. ent. Soc.*, **XLVIII**, 237.

Wholly fuscous-black with rather dense greyish-white dust, mesonotum with conspicuously interrupted dark vittae, abdomen with a narrow (♂) or moderately broad (♀) median vitta, which is complete or almost so in male but often shortened on the fourth segment in female. *Head* rather densely dusted greyish-white, the dust somewhat golden on jowls and slightly yellowish on parafacialia; eyes very short-haired, almost bare, in male, practically bare in female; in male separated by $\frac{1}{8}$–$\frac{1}{12}$ head-width, interfrontalia complete, brown or blackish-brown, hardly dilated to vertex, slightly more to lunula, parafrontalia linear, somewhat broadened anteriorly, with a row of about 8–12 strong setae interspersed with a few small ones, ocellars and inner verticals rather

strong, outer verticals rather weak; frons of female about three-tenths (0·29–0·34) head-width at vertex, slightly dilated with almost straight sides to lunula, where it is about two-fifths (0·38–0·43) head-width, frontal triangle dusted grey, not or hardly exceeding the interfrontal setae, which lie at middle of frons, interfrontalia almost parallel-sided, slightly narrowed behind and in front, parafrontalia with 5–6 somewhat unequal inclinate setae, upper part with or without one or a few rather strong proclinate setulae, but anterior part of parafrontalia bare outwards of the inclinate setae, ocellars and inner verticals strong, outer verticals moderately strong; parafacialia in male more, in female less, than half as wide as third antennal segment, jowls more (♂) or less (♀) conspicuously wider than that segment. Antennae falling short of mouth-margin by fully their own width (♂) or by about half their width (♀); arista plumose, length of hairs somewhat variable, the longest almost one-half to two-thirds that of width of third antennal segment, slowly becoming shorter on more than apical half of arista. *Thorax* with 5 (♂) or 4 (♀) dark vittae in front of suture, which terminate already at level of posterior *prst dc*, the median vitta of the male tending to coalesce with the paramedian ones, *post* part with somewhat indefinite fused paramedian vittae, which do not reach third *post dc*, a rather narrow vitta outward of the *dc*, which reaches the innermost (small) postalar, and a broad vitta to the outer side of the *ia*; 2–3 + 1–3 *acr*, 2+4 strong *dc*, 2 rather strong *ia*, the anterior one about level with second *post dc*, *pra* rather small or indistinct; 1+2–3 *stpl*, upper anterior (embossed) part of hypopleura without or with a few dark setulose hairs. *Abdomen* oblong-ovate, in male truncate, in female pointed at apex, rather densely dusted greyish-white with some shifting dark reflections, especially in female, median vitta of each segment parallel-sided in male, somewhat tapering behind in female, hair in male long and rather erect, with strong lateral discals and marginals on anterior segments and a row of strong marginals on third and fourth segments and weaker ones on second, fourth also with a row of strong discals; hairs and setae of female much shorter and more decumbent, the marginal rows much less developed. *Wings* greyish subhyaline with light brown veins; r_1 somewhat (♂) or hardly (♀) exceeding level of *r-m*, which lies near three-fifths (♀) or two-thirds (♂) of discal cell; r_{4+5} and *m* subparallel at apex, r_{4+5} somewhat sinuous, *m* very slightly curved back, *m-m* slightly concave outwardly in middle part. Calyptrae greyish-white, opaque, with concolorous border and fringe. Halteres fuscous. *Legs* without

submedian setae on anterior tibiae apart from the 2–3 *p* setae of the mid tibia; front femur with only normal decumbent hairs on apical part of *av* surface; mid femur in basal half with about 4–6 short but quite strong *av* and a similar row of *pv* setae, and near apex with a small *a* and 2 rather strong *pd* pre-apicals; hind femur in addition to the *ad* row of strong setae with an *av* row, which consists of long strong setae on less than apical half and short erect ones on basal half, the difference between the two halves being much less pronounced in female, *v* surface in male towards middle with a stout erect seta, which may be preceded by 2–3 weak ones, in female with a strong seta at two-fifths, which is normally preceded by some weaker ones, hind tibia in male with a fringe of *ad* and *av* setae, which are longer than tibial diameter, on middle part of *pv* surface with setulose hairs of similar length, in female with 2–3 setae each on *av*, *ad* and *pd* surfaces but without outstanding hairs on *pv* surface.

Length.—5·0–7·8 mm., of wings 5·2–7·0 mm.

Distribution.—BURMA: Magayi Res., Insein, 6.XII.28 ex *Tectona grandis* (teak) (*D. J Atkinson*). C. AND N. EUROPE. CANADA. U.S.A.

The description is based on British specimens. The only specimen from the ORIENTAL REGION is a teneral female which fits the above description apart from the fact that the vertex is slightly narrower (0·27 times head-width), the vitta of the abdomen is broader and suffused, and the *pd* surface of the hind tibia carries only the normal *Phaonia* seta. The difference in the abdominal vitta is probably only apparent, as the median part of the abdomen is somewhat shrunk and deformed through the immature condition.

Genus 25. **Pogonomyia** Rondani.

1870. *Pogonomyia* Rond., *Bull. Soc. ent. ital.*, II, 336. Genotype: *P. alpicola* Rond.

Head (Fig. 78) with a bunch of upcurved bristles on anterior part of jowls outwards and dorsad of the peristomal row, frons of male narrow, of female moderately broad, and with a pair of cruciate interfrontal and 1–2 pairs of proclinate orbital setae; upper part in female with two subequal setae which are bent outward and backward. Antennae rather short, arista almost bare to short-plumose, the longest hairs less than half as long as width of third antennal segment. *Thorax* with weak *acr*, except for the *prsc*, 2+3 *dc*, 2 strong *ia*; *pra* strong; 1+2 *stpl*; underside and lateral surface of scutellum bare below level of setae; prosternum, propleural depression,

pteropleura and hypopleura bare. *Abdomen* moderately elongate. *Wings* with *c* setulose only on anterior edge, the other veins without setulae, *sc* hardly sinuous beyond the part farthest from *c* (much as in *Hydrotaea*, *see* Pl. 2, fig. 19), *m* straight or slightly curved backward in apical part, sixth vein approaching but not definitely reaching wing margin (*see* note under *P. fumipennis*), seventh vein moderately and very gradually curved towards the sixth. Lower calyptra rather small, though projecting below upper one, of *Phaonia* type. Halteres fuscous. *Legs* rather strongly setose, much as in *ANTHOMYIINAE*, hind coxa without setulae on posterior apical edge, hind tibia with two or more *pd* setae.

Distribution.—PALAEARCTIC and NEARCTIC REGIONS, in the ORIENTAL REGION only one species, which is known from Kashmir.

Biology.—The females of at least one European species (*decolor*) can be troublesome as 'sweatflies' like the species of *Hydrotaea*. Larvae in humus, zoophagous.

Some of the characters are subject to exceptions in non-Oriental forms, the cruciate interfrontals being absent and the male frons wide in *tetra*, 4 *post dc* being present in ('*Trichopticoides*') *decolor* Fln., etc.

126. **Pogonomyia fumipennis** Malloch.

(Figs. 78, 79)

1921. ! *Pogonomyia fumipennis* Mall., *Ann. Mag. n. H.* (9), **VIII**, 235. Type: Gulmarg. B.M.

Fuscous-black, matt, with thin greyish-brown dust, which is somewhat denser on shoulders, lateral part of suture, and in posterior view on a parabolic tongue extending from lateral surface of the posterior three abdominal segments towards middle. *Head* very dark, face with some brownish-grey dust, parafacialia fuscous, in a strongly oblique view appearing golden-white; eyes almost bare, separated by less than one-twelfth head-width, interfrontalia velvety black, very narrow above middle, slightly widened to ocelli, rather broadly triangular above lunula, parafrontalia with a dense row of 12–14 inclinate setae, of which the upper 1–2 are reclinate and close to level of anterior ocellus; ocellars fine and rather long, hardly differing from the other bristles of the ocellar tubercle, verticals long and rather fine, outer ones only slightly longer than adjacent occipital setulae; parafacialia almost, jowls almost twice, as wide as third antennal segment, mouth-margin somewhat produced. Third antennal segment falling

short of mouth-margin by more than its own width; arista short-plumose, only a quarter or third narrower, including plumosity, than that segment. *Thorax* with 2+1 distinct or indistinct *acr*, 2+3 strong *dc*, 2 strong *ia*, the anterior one hardly behind level of the first *post dc*; *pra* as strong as the first *npl* and almost twice as strong as the second, notopleura with some erect hairs on anterior half; propleural and prostigmal well developed but not very conspicuous among the adjacent bristly hairs, anterior mesopleural absent, 1+2 *stpl*, the posterior two rather close together. *Abdomen* with decumbent short hairs on disc and very long erect bristly hairs at sides, each segment with a row of marginals, which on the anterior segments become weak near middle, the discals

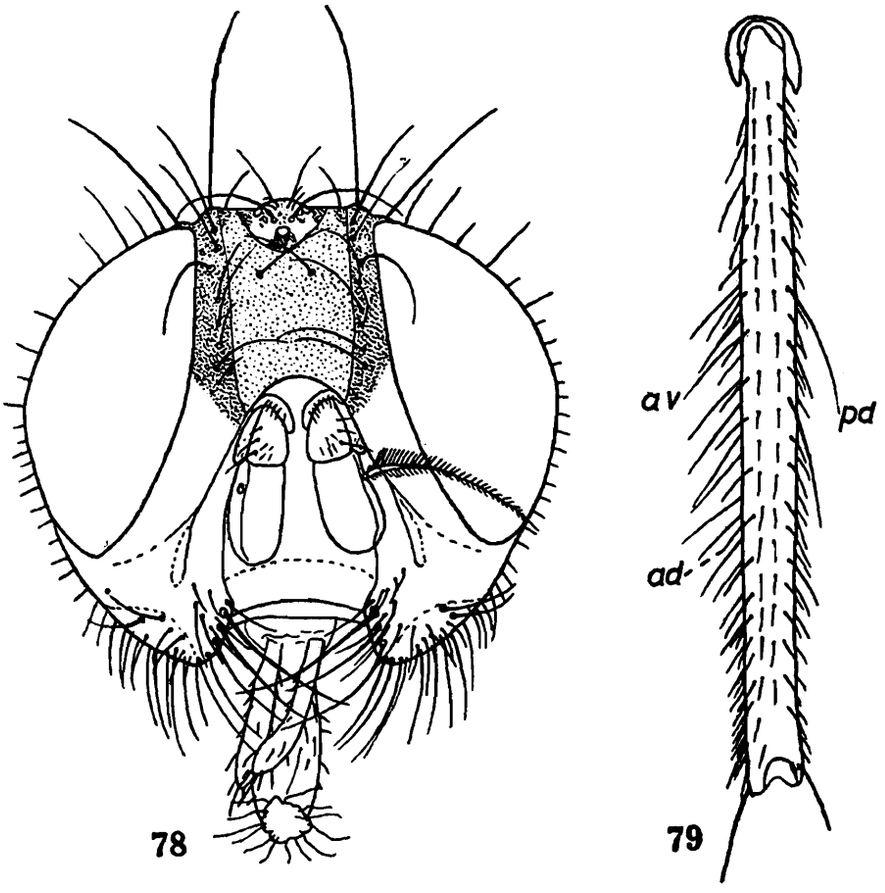


FIG. 78. *Pogonomyia fumipennis* Mall., head of female.

FIG. 79. *Pogonomyia fumipennis* Mall., left hind tibia, dorsal view. ad, *ad* setae; av, *av* setae; pd, *pd* setae.

well developed at sides of anterior segments, where they are not markedly stronger, however, than the bristly hairs well developed on fourth segment, fifth segment apparently bare, sixth with numerous long erect bristly hairs; hypopygium

slightly prominent, fourth ventrite with a broad and rather deep apical emargination. *Wings* strongly infuscated, especially in *1C*, *2C* and *Sc*, apical and hind margins broadly and suffusedly paler; r_{4+5} and *m* slightly diverging at extreme tip, *m-m* straight and rather upright. Calyptrae subopaque white, with concolorous border and fringe. *Legs* with claws and pulvilli not elongated; fore tibia with a *p* seta beyond middle and 2–3 *pv*; mid femur with complete rows of long *av* and *pv* setae, which become much shorter on apical fourth, mid tibia without *ad* and *av* setae but with 3–4 *pd* and 3–4 *pv*; hind femur with a complete row of long and strong (especially on apical half) *av* and *ad* setae and with numerous long fine erect *pv* hairs on basal half, hind tibia of male (Fig. 79) produced into a small short *v* apical process at the base of which lies the *av* spur, with 3 *pd* setae and numerous half-erect setulae on *ad*, *a* and *av* surfaces, these setulae becoming shorter and more decumbent towards apex and base.

Length.—5·6–6·6 mm., of wings 4·9–5·2 mm.

Distribution.—INDIA: Kashmir.

In the males the sixth wing vein can be seen to reach the margin as a fine fold, as in *ANTHOMYIINAE*, if the reflections of the surface are examined, but this is not the case in other species of *Pogonomyia* nor in the present species if it be viewed by transmitted light. The other characters, *e.g.* the process of the hind tibia of the male, show that *fumipennis* is a true *Pogonomyia*, and it is very probable that this genus forms a phylogenetic link between *PHAONIINAE* and *ANTHOMYIINAE*.

Two females from Killanmarg (Kashmir), 10,500 ft., 5.VII. 31 (*T. B. Fletcher*), have a shorter sixth vein, pale wings, shorter antennal hairs which are not (the ventral ones) or very little (the dorsal ones) longer than basal diameter of arista, the *npl* subequal, the notopleura without hairs, the fore tibia with only 1 *pv* and without a *p* seta, the mid tibia with 1–2 *ad* and only one *pv* (and with 3 *pd*), the hind tibia in addition to the 3 *pd* with 3 *ad* and 2–3 *av* setae and, of course, without the half-erect setulae, and are markedly smaller (3·4–4·2 mm. long, wing length 3·6–3·9 mm.). Whether they belong to this or a different species of males cannot be ascertained at present, though the latter is perhaps more probable.

Genus 26. **Megophyra** gen. n.

Large slender *PHAONIINAE* somewhat reminiscent of *Hermetia* (STRATIOMYIIDAE), with dark body and largely

pale legs. *Head* much higher than long, with large, in male subcontiguous, practically bare eyes; inclinate frontal setae not reaching upper third of frons (♂ ♀), frons of female less than a third head-width, without cruciate interfrontal, but with a pair of proclinate orbital, setae, occipital dilation on jowls indistinct and quickly tapering out, peristomal margin at about level of fore margin of eye with a single strong upcurved seta (Fig. 80), the other peristomal setae being directed downward and forward. Third antennal segment elongate, arista thin, only slightly thickened at base, short-haired, the longest hairs on lower surface hardly reaching length of basal diameter, those on upper surface up to twice that length. Proboscis normal, palpi in male slightly, in female strongly, flattened and dilated. *Thorax* with 0+1 weak *acr*, 2+3 strong *dc*, only the anterior *prst* one being somewhat weaker, 1–2 *ia*, *pra* absent, indistinct or small; propleural and prostigmal well developed, anterior mesopleural absent or very small, 1+2 strong *stpl*, prosternum, propleural depression, pteropleura and hypopleura bare. *Abdomen* elongate, in male almost parallel-sided, in female oblong-ovate with pointed apex, each segment with a marginal row, which is indistinct near middle of anterior two segments, but which consists of strong setae laterally and on posterior segments, only the fourth with a few weak discals towards sides. *Wings* evenly haired, costal spine absent, the other veins without setulae, *sc* slightly sinuous beyond the part farthest from *c*, apical part moderately strong bent up to *c*, r_{4+5} and *m* somewhat converging at apex, r_{4+5} being curved backward and *m* slightly or very slightly upcurved. Lower calyptra of *Phaonia* type, conspicuously projecting below the upper one. Halteres pale. *Legs* elongate, fore femora and tibiae of male without teeth, spines or tubercles on *v* surface; mid femur without an *a* pre-apical but with a small *ad* seta at apical fifth, which in male is more or less indistinct; hind coxa bare on *p* surface, hind tibia with a well-developed *ad* pre-apical, without a *pv* apical seta, and with a very strong *pd* seta near apical third.

Genotype: *M. penicillata* sp. n.

Distribution.—Known only from N.E. BURMA and N.E. INDIA: Darjeeling.

Biology.—Unknown.

Closely related to *Hydrotaea* and *Ophyra* but without the spines or teeth of the front femora found in the former genus, and without the glossy black or blue-black integument of *Ophyra*. In Séguy (1937, Gen. Ins. fasc. 205) the genus would be traced to the N. American *Eupogonomyia* Mall., which differs by the presence of an apical ventral process at

the tip of the male hind tibia, the presence of outstanding setae on some of the tarsal segments and fore tarsi which do not exceed the length of the fore tibiae, whilst in the present genus they are more than half again the length of the tibia.

Four females of this genus from Kambaiti are at hand. They have the tibiae pale and the aristal hairs only moderately short, so they cannot belong to *fuscitibia*, but I am not in a position to determine to which of the other three species they belong.

Key to the species of Megophyra.

1 (2) Tibiae piceous, the hind one in male on *pv* surface with a row of about four fine setae near middle, which are longer than tibial diameter. Dorsal hairing of arista narrower than its basal width. R_5 conspicuously narrowed at apex. *fuscitibia* sp. n., p. 295

2 (1) Tibiae wholly or almost wholly pale, the hind ones on *pv* surface often with more or less long hairs but without an outstanding row of setae.

3 (4) Only the posterior *ia* present. All tibiae wholly pale ferruginous. Apical section of *m* very distinctly (though slightly) upcurved in more than apical third. ♂: Hind femur without a pre-apical tuft of bristles, a few proximal ones of the fine *pv* setae on almost apical half longer than width of femur but shorter than the *av* setae; *v* and *pv* surfaces of hind tibia with only fine half-erect hairs, the longest of which approach twice width of tibial diameter; *pv* row of fore femur double to triple, dense and conspicuous. .... . *intraalaris* sp. n., p. 294

4 (3) Two *post ia* present.

5 (6) Posterior tibiae browned on basal third. Anterior *post ia* very slightly in front of level of first *post dc*. Apical section of *m* very distinctly (though slightly) upcurved in more than apical third. Dorsal hairing of arista distinctly wider than base of arista. ♂: Hind femur without a pre-apical *pv* tuft of bristles, the fine setae vendrad to the *av* row and the corresponding fine *pv* setae on more than apical third very long and fine, mostly somewhat longer

than the nearest *av* setae and almost twice as long as width of femur; *pv* row of fore femur moderately dense and inconspicuous at apex. . . . . *hirtitibia* sp. n., p. 296

6 (5) All tibiae wholly pale ferruginous. Anterior *post ia* slightly behind level of first *post dc*. Apical section of *m* almost straight. ♂: *pv* setae and setulae on apical third of fore femur forming a very dense and conspicuous multiple row.

7 (8) ♂: Hind femur (Fig. 81) at apical fourth with a marked *pv* swelling on which a dense tuft of long black erect bristles with wavy tips is placed, the longest of these bristles about twice as long as greatest width of femur..... . *penicillata* sp. n., p. 292

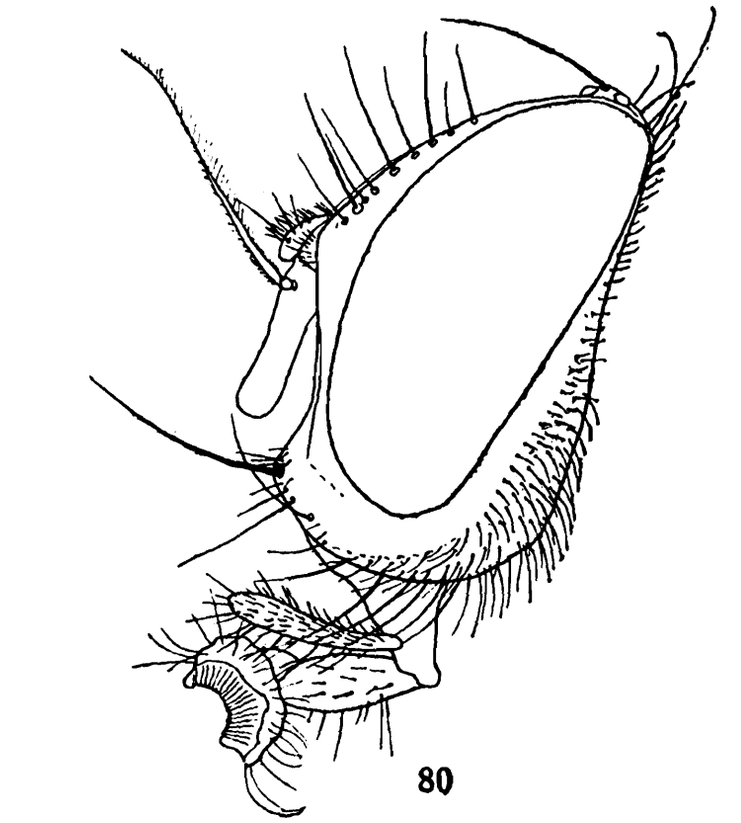
8 (7) ♂: Hind femur without a pre-apical tuft of bristles, the *av* setulae next to the *av* row of setae much shorter than these setae, the *pv* row consisting of dense and fine setulae on apical third, which are not longer than greatest width of femur... .... *simplicipes* sp. n., p. 297

127. **Megophyra penicillata** sp. n.

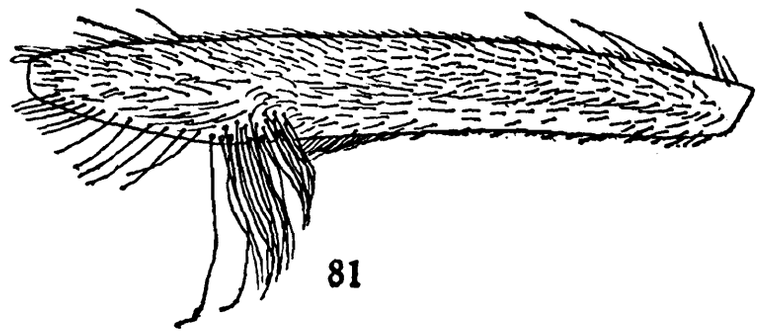
(Figs. 80, 81)

♂: Fuscous-black with the parafrontalia, parafacialia, shoulders, notopleurae, and an elongate median spot behind neck dusted silver-white, in posterior view large parts of thorax and abdomen appearing pale grey dusted; legs pale-ferruginous with fuscous tarsi. *Head* (Fig. 80) with the interfrontalia obsolete at middle, very narrow above, and narrow below, parafrontalia very narrow and only slightly broadened near lunula, with 8–9 long inclinate setae; ocellars strong, verticals long and distinct, but very fine; parafacialia about a third, jowls fully to half again, width of third antennal segment, the latter falling short of mouth-margin by about its own width; dorsal hairs of arista half as long again as its basal diameter, ventral hairs sparse and not longer than its basal diameter. Palpi rather conspicuously flattened and dilated. *Thorax* in posterior view with the beginning of four black vittae, some grey dust being present on the *dc* strip in addition to the silver-white median spot, the grey dust becoming indefinite shortly behind the first *post dc* and also present on a faint but rather broad band on outer part of suture;

anterior *ia* hardly behind level of first *post dc*, *pra* indistinct. *Abdomen* slightly and almost evenly narrowed from posterior part of first segment to tip where it is broadly truncate; evenly and in posterior view moderately densely grey-dusted, in posterior view first segment with an undusted dark sub-triangular basal spot, the other segments with only traces of a



80



81

FIG. 80. *Megophyra penicillata* sp. n., head of male.

FIG. 81. *Megophyra penicillata* sp. n., left hind femur of male, posterior view.

dark median line, hind margins appearing narrowly dark on their declivous part, in dorsal view the whole abdomen shining fuscous-brown with some pale grey dust towards sides. *Wings* subhyaline with a slight ochraceous tinge, veins light brown with paler bases; *m* scarcely noticeably and gradually

upcurved at apex, almost straight. Calyptrae ochraceous with concolorous border and fringe, lower one subopaque. Halteres pale reddish-yellow. *Legs* very slender; fore femur in addition to the *pv* row of setae with numerous setulae on *v* surface, these become dense and conspicuous on apical half where they form a multiple row, fore tibia without a submedian seta, the *pv* and *v* hairs dense and fine, half-erect and about as long as tibial diameter; mid tibia with two strong *p* setae and between them a very small or indistinct one; hind femur (Fig. 81) somewhat swollen in apical two-fifths, with a complete row of strong *ad* and *av* setae, the *av* ones very long on apical half, *pv* surface with a dense tuft of numerous long erect bristles with wavy tips at apical fourth where the swelling is most pronounced, hind tibia with 3 *ad* and 4–6 *av* setae, but some of the proximal ones rather weak and alternating with long setulae, thus not very clearly differentiated.

Length.—7·7–10·0 mm., of wings 8·7–10·7 mm. (the larger measurements refer to the type).

Distribution.—N.E. BURMA: Kambaiti, 2,000 m., 23.IV.34 (*R. Malaise*), ♂ type (in Mus. Stockholm), 28.IV.34, 1 ♂ paratype (in B.M.).

128. **Megophyra intraalaris** sp. n.

♂: Colouration and pollinosity as in *penicillata*. *Head* with the interfrontalia just obsolescent at middle, narrow above and below, parafrontalia linear above, narrow and slightly broadening forward on anterior two-thirds, with 7–9 long inclinate setae; ocellars rather strong, verticals small and not very distinct; parafacialia almost one-half as wide, jowls fully half as wide again, as third antennal segment, the latter falling short of mouth-margin by about its own width; longest dorsal hairs of arista as long as its basal width, ventral hairs about half that length. *Thorax* with the dark vittae grey-dusted and rather faint *pra* hair-like. *Abdomen* as in *penicillata*, the dark median line on the intermediate segments rather conspicuous. *Wings* subhyaline with a slight brownish tinge, the base more ochraceous, veins light brown with ochraceous-brown bases; *m* very slightly but quite distinctly upcurved towards apex. Calyptrae ochraceous, including border and fringe. Halteres dull orange. *Legs* very slender; fore femur in front of the normal *pv* row with 2–3 rows of shorter black setae, thus with an irregular double or triple row; fore tibia without a *p* seta (present on one side of type), hairs as in *penicillata*; mid femur with 2–3 outstanding *pv* setae towards middle, mid tibia with two strong *p* setae at

middle and at apical third; hind femur, besides the *ad* row, with a complete row of almost 10 *av* setae, those on apical half stronger and more *v* in position and direction, apical half of *pv* surface with a row of fine erect setae, 2–3 of them near the proximal end of the row longer than diameter of femur, but shorter than the corresponding much stronger *av* setae, and even the longest one much less than twice length of femoral diameter, hind tibia with a row of *ad* setulae, which beyond middle terminates in a strong *ad* seta, *av* surface with 5–7 setae on more than apical half, *av*, *v* and *pv* surfaces on intermediate two-quarters in addition with numerous fine half-erect hairs, the longest of which do not reach twice length of tibial diameter.

Length.—9·4–9·6 mm., of wings 8·3–8·7 mm.

Distribution.—N.E. INDIA: Darjeeling, 7,000 ft., 28.V.10 (*E. Brunetti*), ♂ type (in Zoological Survey of India, Calcutta), 1 ♂ paratype (in B.M.).

129. **Megophyra fuscitibia** sp. n.

♂: Colouration and pollinosity as in *M. penicillata*, but all tibiae and the extreme tip of the femora piceous-brown to fuscous-black. *Head* with the interfrontalia linear at middle and narrowly triangular above and below, parafrontalia linear in upper third, otherwise narrow and only slightly broadening to lunula, with 9–11 long inclinate setae and 2 setulae between the setae and anterior ocellus; ocellars and inner verticals rather long and strong, outer verticals fine but long and distinct; parafacialia hardly a third, jowls more than half as long again as width of third antennal segment, the latter falling short of mouth-margin by almost its own width; arista almost twice as long as third antennal segment, the hairs of the dorsal side hardly longer than basal diameter of arista. Palpi markedly flattened and dilated. *Thorax* in posterior view with more extended vittae than in *penicillata*, the pale dusted vittae in the *dc* strip passing the second *post dc*; anterior *ia* very slightly *anterior* to level of first *post dc*, *pra* absent or indistinct. *Abdomen* as in *penicillata*, but the median line at most indicated by some slight brown dust. *Wings* subhyaline with a slight brownish tinge, which becomes more ochraceous at base; veins brown, somewhat light brown at base; *m* rather markedly and broadly—but not at all strongly—upcurved beyond middle of apical section. Calyptrae subopaque, ochraceous with concolorous border and fringe. Halteres reddish-yellow. *Legs* very slender; fore femur with a row of setulae to the *v* side of the *pv* setae, the latter shorter

and closely set on apical third and forming together with the setulae a dense somewhat irregular double or triple comb, fore tibia with the *pv* and *v* hair as in *penicillata* but darker; mid tibia with 2 strong *p* setae; hind femur with a row of strong *ad* and *av* setae, the *av* ones weak on basal half and very long and strong on apical half and with some fine long hairs on *av* and *pv* surfaces near apex, hind tibia with an irregular row of *ad* setae, of which 3 on apical half are longer, with a dense row of long *av* bristles on apical half or a little more, and with about 4 *pv* setulae near middle, which are somewhat longer than tibial diameter.

Length.—8·1–11·7 mm., of wings 8·6–10·3 mm.

Distribution.—N.E. BURMA: Kambaiti, 2,000 m., 23.IV.34 (*R. Malaise*), ♂ type (in Mus. Stockholm), 1 ♂ paratype (in B.M.), 20 and 30.V.34, 3 ♂ paratypes (in Mus. Stockholm, B.M. and Mus. Helsinki).

130. **Megophyra hirtitibia** sp. n.

♂: Colouration and pollinosity as in *penicillata*, but the paramedian dark vittae rather well defined in posterior view up to level of last *dc*, and basal third of posterior tibiae suffusedly browned. *Head* with the interfrontalia obsolescent at middle and narrowly triangular above and below, parafrontalia very narrow, evenly very slightly broadened to lunula, with 8–9 not very strong inclinate setae; ocellars strong, verticals fine but apparently distinct (judged from pores); parafacialia less than one-third, jowls fully, width of third antennal segment, the latter falling short of mouth-margin by less than its own width; arista twice as long as third antennal segment, evenly short-haired, longest hairs on dorsal surface half as long again as basal diameter of arista, those on ventral surface well developed but hardly longer than basal diameter of arista. Palpi distinctly flattened and dilated. *Thorax* with the vittae even more extended in posterior view than in *fuscitibia*, the pale dusted median vitta being dark brownish-grey behind suture but rather well-defined from the undusted paramedian vittae, the pale dusted vitta on the *dc* strip also rather well defined interiorly; anterior *ia* with the anterior margin of its pore slightly in front of level of anterior margin of first *post dc* (always ?), *pra* represented by a slightly longer hair. *Abdomen* as in *penicillata*. *Wings* with a slight brownish tinge, veins brown to light brown, *m* as in *fuscitibia*. Calyptrae pale brownish-yellow with concolorous border and pale golden fringe, lower one subopaque. Halteres yellowish-white. *Legs* very slender, fore femur without the dense

multiple row of setae near apex, which is found in the other species, the *pv* setae not much denser near apex, and the setulae small and inconspicuous, fore tibia as in *penicillata*; mid tibia with two strong *p* setae; hind femur with a complete row of strong *ad* and *av* setae, the latter even longer on apical two-fifths, ventrad to the *av* setae with a row of long setulose hairs or fine setae, those on apical two-fifths hardly shorter than the *av* setae, *pv* surface with a rather dense row of similar long setulose hairs, those on apical third being fully as long as the *av* setae, hind tibia with 2–3 strong *ad* setae, which form part of a row of smaller setae and setulae, *av* surface with 3–4 long and strong setae, the *av*, *v*, *pv* and *p* surfaces (and to a lesser extent the other surfaces) with moderately long half-erect and more decumbent fine hairs, especially on intermediate third.

Length.—7·7 mm., of wings 7·9 mm.

Distribution.—N.E. BURMA: Kambaiti, 2,000 m., 18.IV.34 (*R. Malaise*), ♂ type (Mus. Stockholm).

131. **Megophyra simplicipes** sp. n.

♂: Colouration and pollinosity as in *penicillata*, but jowls and facial ridges pale testaceous below the dust (in the other species infuscated dull reddish). *Head* with the interfrontalia obsolete at middle and narrowly triangular above and below, parafrontalia very narrow above, slightly broadened at middle and below, with 8 not very long inclinate setae on anterior three-fifths and a minute setula just in front of level of anterior ocellus, ocellars strong, inner vertical rather strong, outer vertical distinct, moderately long; parafacialia about one-third, jowls one and one-third times, width of third antennal segment; the latter falling short of mouth-margin by almost its own width; arista less than twice length of third antennal segment, longest hairs on dorsal surface twice as long as basal diameter of arista, those on ventral surface slightly shorter than that diameter; second antennal segment rufous-brown. Palpi rather conspicuously flattened and moderately broad. *Thorax* with rather thick pale dust, the paramedian vittae therefore faint, and the outer vittae conspicuous only on their outer part; anterior *ia* distinctly behind level of first *post dc*, *pra* absent. *Abdomen* as in *penicillata*, basal spot of first segment reaching posterior fifth, basal fourth of second segment with a well-defined fuscous median line, third segment with a slight indication of a brownish median line at base. *Wings* subhyaline with a brownish tinge, base somewhat ochraceous, veins light brown, broadly

pale testaceous at base; r_{4+5} conspicuously curved back, *m* almost straight, only scarcely noticeably upcurved close to tip, *m-m* rather sinuous and oblique. Calyptrae greyish-ochraceous subopaque with ochraceous border and pale golden fringe. Halteres pale reddish-yellow. *Legs* very slender, the *pv* setae of the fore femora a trifle shorter on basal two-thirds than at apical third, where they are much denser and slightly stronger and accompanied by an irregular somewhat more ventral row of rather strong setulae, fore tibia as in *penicillata*; mid tibia with two rather strong *p* setae; hind femur with a well-developed *ad* row, but with only a few short and inconspicuous *av* setae, except on apical two-fifths where they suddenly become long and strong, *pv* surface with dense setulose hairs on apical third, which hardly attain length of femoral diameter, otherwise without outstanding *av* or *pv* setulae, hind tibia with 2–3 moderately strong *ad* setae which belong to a row of *ad* setulae, *av* surface with 5–8 stronger setae in a row of setulae which extends over apical three-fifths, *pv* surface with an irregular row of half-erect moderately long fine hairs or weak setae, which do not approach base and apex.

Length.—8·9 mm., of wings 9·1 mm.

Distribution.—N.E. BURMA: Kambaiti, 8,000 ft., 8.V.34 (*R. Malaise*), ♂ type (in Mus. Stockholm).

Genus 27. **Ophyra** Robineau-Desvoidy.

1830. *Ophyra* R.-D., *Myod.*, 516. Genotype: *Anthomyia nitida* R.-D. (= *pubescens* R.-D. = *leucostoma* Wied.).

Head with subcontiguous eyes in male, with a moderately broad frons in female; eyes bare and very large; parafacialia and jowls therefore narrow; inclinate frontal setae not or slightly exceeding middle; ocellars and other setae rather weak, verticals indistinct in male, small in female; frontal triangle large and glossy in female (Fig. 82) where it exceeds middle or even reaches lunula (but distinctly dusted in *obscurifrons*), the cruciate interfrontal setae present and their pores more or less encroaching upon the side margins of the triangle; lunula normally conspicuous by silver-white dust. Antennae not reaching mouth-margin; arista virtually bare. *Thorax* without marked pollinosity, dorsal setae never very strong, often partly indistinct, 4 *post dc*; prosternum, propleural depression, pteropleura and hypopleura without hairs but with fine erect pile, anterior mesopleural absent, 1+1 *stpl* (the anterior one often indistinct). *Abdomen* ovate

(♂) or triangularly subcordate (♀), without any strong setae though with at least some erect stronger marginal hairs. *Wings* hyaline; *sc* only slightly curved forward, not sinuous (as in Pl. 2, fig. 19), unusually straight from shortly beyond *p* onwards; r_{4+5} and *m* markedly converging to apex, without setulae; sixth vein moderately long as is the seventh, their apices not or hardly converging. Halteres fuscous. *Legs* rather short; fore tibia without a *p* seta; mid femur without an *a* pre-apical, mid tibia without an *ad* or *av* submedian seta, but with 2 *p* setae.

Distribution.—All zoogeographical regions, the ORIENTAL REGION containing more species than any other.

Biology.—Flies active in sunshine and often forming dancing swarms at least in temperate climate. Eggs according to Keilin and Tate (1930, *Parasitol.*, **XXII**, 170–172) without flanges, similar to the eggs of *MUSCINAE* and *ANTHOMYIINAE*. Larvae (*Leucostoma* Wied., Keilin and Tate, 1930; Zimin., 1948, *Opred. Faune, S.S.S.R.*, **XXVIII**, 55; *capensis* Wied., Zimin., 1948, *ibid.*, 53–55; *nigra* Wied., Fuller, 1932, *Proc. Linn. Soc. N.S.W.*, **LVII**, 89–90) in dung, carrion, birds' nests, etc., predacious on larvae of *Eristalis* (SYRPHIDAE), *Fannia*, *Musca* (MUSCIDAE), etc., and of considerable importance in regulating their numbers. Pupae in soil near dung and in birds' nests, with strikingly large prothoracic horns (Keilin and Tate, 1930).

The genus has been revised by Malloch (1923, *Ann. Mag. n. H.* (9), **XI**, 664) and Sabrosky (1949, *Proc. Hawai. ent. Soc.*, **XIII**, 423). Most of the species have a very wide distribution. Except for the simple male fore legs this genus is not easily separated from *Hydrotaea*, and the Oriental subgenus *Parahydrotaea* (with less modified male fore legs), and the Australian subgenus *Australophyra* (with simple male fore legs and inconspicuous small and dusted female frontal triangle) make it impossible to separate the two genera by a single character for each sex. In the generic key the males of subgenus *Australophyra* would therefore be traced to the present genus but the females to *Hydrotaea*.

Key to the species of Ophyra.

1 (2) Legs dull yellowish-brown, tarsi black. Shoulders with a distinct cream-yellow spot at least in male. 4 mm. (*see* under *O. capensis*).... *caerulea* Brun., p. 305

2 (1) Legs black, but the tarsi, especially the front ones, sometimes with pale apices to the segments.

3 (6) Eyes not emarginate at middle of hind margin. *prst acr* and *dc* conspicuous. Hind tibia with 1–2 *ad* setae. ♀: Frontal triangle elongate with straight or almost straight sides (Fig. 82*c*), falling short of lunula by the width of the latter, cruciate interfrontal setae not more widely separated from each other than from eye-margin.

4 (5) Calyptrae with yellow border and fringe. Apices of tarsal segments, especially of fore tarsi, narrowly yellowish (less conspicuously so in ♀; tarsi to be examined in apical view). Thickened basal part of arista pale ferruginous. ♂: Hind tibiae straight, with 2–4 *av* setae and some longish hairs on *v* and *pv* surfaces of apical half. ♀: Hind tibia as a rule with only 1 *av* seta. ... . *chalcogaster* (Wied.), p. 301

5 (4) Calyptrae with brown border and fringe. Apices of tarsal segments not yellowish. Thickened basal part of arista wholly (♀) or at least in part (♂) fuscous. ♂: Hind tibiae strongly curved, with numerous long half-erect setae and hairs on *av*, *v* and *pv* surfaces of apical three-fourths. ♀: Hind tibia with 2–4 *av* setae *leucostoma* (Wied.), p. 302

6 (3) Eyes conspicuously emarginate at middle of hind margin opposite the shoulders (Fig. 82*a*). Anterior *stpl* often indistinct. ♂: Mid femur near base with 2–3 short erect black spine-like setae. ♀: Frontal triangle broad with distinctly convex sides (Fig. 82*b*), the cruciate interfrontal setae considerably more widely separated from each other than from eye-margin.

7 (8) *prst acr* and *prst dc* conspicuous, separated by a distinct bare longitudinal strip. ♂: *av* pre-apicals of hind femora not or slightly longer than femoral diameter, *av* and *pv* hairs of hind femora less than 1½ times length of tibial diameter; base of mid and hind femora with 1–3 erect short spiniform setae. ♀: Frontal triangle

falling short of lunula by more than length of latter, hardly twice as long as wide; hind tibia with one short *av* seta.... ..... *nigra* (Wied.), p. 303

8 (7) *prst acr* and *prst dc* very fine, mesonotum rather evenly covered by fine erect hairs. ♂: 1–2 of the *av* pre-apicals of the hind femora about twice as long as femoral diameter, the others also much longer than that diameter; many of the *av* and *pv* hairs of hind tibiae more than twice length of tibial diameter; base of hind femora with only an erect fine *v* hair. ♀: Frontal triangle almost or fully reaching lunula, more than twice as long as wide.

9 (10) Parafrontalia, upper part of parafacialia and dorsal surface of scutellum glossy bluish-black, without any pollinosity. . *capensis* (Wied.), p. 305

10 (9) Parafrontalia, upper part of parafacialia and dorsal surface of scutellum with greyish-brown pollinosity, dull or only slightly shining. *obscurifrons* Sabr., p. 307

132. **Ophyra chalcogaster** (Wiedemann).

1824. *Anthomyia chalcogaster* Wied., *Anal. ent.*, 52; 1830, *Aussereur. zweifl. Ins.*, II, 427. Type: Java. Mus. Copenhagen.

1830. *Anthomyia metallica* Wied., *Aussereur. zweifl. Ins.*, II, 435. Types: East India. Mus. Copenhagen.

1856. ! *Anthomyia indicata* Walk., *Dipt. Saund.*, 362. Type: East Indies. B.M.

1858. ! *Ophyra congressa* Walk., *Trans. ent. Soc. Lond.*, V, 317. Type: Hindustan. B.M.

1858. *Ophyra riparia* Dol., *Nat. Tijdschr. Nederl. Ind.*, XVII, 115; Walk., 1860, *Proc. Linn. Soc. London*, IV, suppl., 160. Types: Amboina. Mus. Vienna?

1913. *Ophyra chalcogaster* (Wied.), Bezzi, *Parasitol.*, XV, 80; Mall., 1923, *Ann. Mag. n. H.* (9), XI, 664, 666; Sabr., 1949, *Proc. Hawai. ent. Soc.*, XIII, 424, 426, 431.

Glossy black with at most indistinct bluish reflections, in certain directions some thin brown dust becomes distinct, which may give the abdomen a bronze sheen. *Head* with large eyes, which in male are virtually contiguous in intermediate third, interfrontalia largely obsolete, parafrontalia linear, anteriorly with 5–10 small inclinate setae; vertex in female more than a quarter head-width, interfrontalia velvety black or brown, frontal triangle with straight sides, not (or

not distinctly) reaching lunula, cruciate interfrontals at middle of interfrontalia on the frontal triangle though closely adjacent to its lateral margin; parafrontalia almost half as wide at middle as interfrontalia, with 4–5 inclinate setae from lunula to almost middle and a proclinate seta slightly above middle; ocellars very small (♂) or small (♀), verticals indistinct (♂) or small (♀). Antennae fuscous, apex of second segment usually somewhat reddish, basal part of arista pale ferruginous. Palpi fuscous. *Thorax* with 2+1 *acr*, the *prst* ones only moderately stronger than the other setulae in the *c*. 3 *prst* rows, less widely separated from each other than from the *dc*, the area between the *dc* and the *acr* being bare ; 2+4 *dc*, the anterior *post* ones rather weak. *Abdomen* of male with the hair short but erect on the basal two segments, except for posterior median part of second. *Wings* subhyaline with pale testaceous veins. Calyptrae with pale golden or yellowish border and fringe. Halteres fuscous. *Legs* fuscous-black or piceous, tips of the segments of the fore tarsi yellowish-white at apex, more broadly so in male and on ventral surface; mid femur without any *v* setae; hind femur with a row of long *av* setae on apical half, a row of rather strong *ad* setae which are more *a* on basal three-fifths, in male with a row of long setulose *pd* hairs on basal three-fifths and with 4–5 very short spine-like *v* setae at base, hind tibia with an *ad* and a rather fine *pd* near middle, in female normally with only 1 *av*, in male with 3–4 *av* setae and numerous *av*, *v*, *pv* and *p* setulose hairs on apical surface, those near middle of *p* surface being the longest.

Length.—4·0–6·3 mm., of wings 4·2–5·4 mm.

Distribution.—Widely distributed in the ETHIOPIAN, ORIENTAL and AUSTRALIAN REGIONS (from SIERRA LEONE to OKINAWA, HAWAII and NEW CALĒDONIA).

One specimen (out of four collected on Kedah Peak within a week in March 1928) has a few small black setulae on apical part of dorsal surface of r_1.

133. **Ophyra leucostoma** (Wiedemann).

(Fig. 82*c*)

1817. *Anthomyia leucostoma* Wied., *Zool. Mag.*, **I**, 82. Type: Holstein. Mus. Kiel?

Glossy black with slight bluish reflections; some brown dust as in *chalcogaster*. *Head* with large eyes, as in *chalcogaster*, but frontal triangle of female with slightly convex

sides (Fig. 82*c*), cruciate setae on margin; ocellars quite conspicuous (♂ ♀), inner and outer verticals indistinct in male, quite strong in female. Antennae fuscous, including arista, the apical portion of the basal incrassate part sometimes somewhat testaceous in male. Palpi fuscous. *Thorax* with 1–2+1 *acr*, the *prst* ones less widely separated from each other than from the *dc* and rather weak among the *acr* hairs; the latter numerous and filling in the space between the *dc* of each side; 2+4 *dc*. *Abdomen* as in *chalcogaster*. *Wings* subhyaline with pale testaceous veins. Calyptrae brown, except for outer part of upper one, with brown border and fringe. Halteres fuscous. *Legs* piceous or piceous-black, tips of the segments of the fore tarsi not markedly pale, even on ventral surface; mid and hind femora of male with a few short but stout erect spine-like *pv* near base, hind tibia in female with an *ad* and *pd* at middle and two or more *av*, in male curved and with numerous long erect hairs and setulose hairs on *av*, *a* and *pv* surfaces, a stronger row being noticeable along *av* surface and especially long and dense hairs near basal third of *pv* surface.

Length.—4·5–7·3 mm., of wings 4·8–6·2 mm.

Distribution.—INDIA: Kashmir, Dal Lake, Nagin. MALAYA: Selangor. Otherwise widely distributed in the NEARCTIC and PALAEARCTIC REGIONS (from the Canary Islands and Britain to Palestine, China and Japan), and probably representing a PALAEARCTIC element in Kashmir. The Selangor specimen must have been introduced if this assumption is correct. The female from Hawaii mentioned by Grimshaw in Fauna Hawaiiensis as *O. leucostoma* has since lost its head, but the pale-bordered calyptrae and other characters show clearly that it belongs to *O. aenescens* Wied.; *leucostoma* is thus definitely unknown from Hawaii.

Sherborn credits this species to Meigen, but although Wiedemann introduces the name as '*Leucostoma* Meig.' Wiedemann is undoubtedly the author of the *description*, as the title of the paper (p. 61) states that the species were described by him, and as the text of the paper does not mention anywhere that descriptions by other authors were incorporated.

134. **Ophyra nigra** (Wiedemann).

1830. *Anthomyia nigra* (Wied.), *Aussereur. zweifl. Ins.*, II, 432. Type: China. Lost.

1830. *Anthomyia gracilis* (Wied.), *Ibid.*, 432. Type: China. Mus. Copenhagen.

1880. *Ophyra nigra* (Wied.), v.d. Wulp, *Tijdschr. Ent.*, **XXIII**, 177; 1881, Dipt. Sumatra Exp., 48; Sabr., 1949, *Proc., Hawai. ent. Soc.*, **XIII**, 428.

1910. ! *Ophyra spinigera* Stein, *Ann. Mus. nat. Hungar.*, **VIII**, 555. Type : Singapore. Mus. Budapest.

1939. *Ophyra fuscocalyptrata* (Macq.) of Hardy, *Proc. Roy. Soc. Queensl.*, **L**, 38 (nec. Macq.).

Glossy purplish-black with thin brown dust. *Head* with very large eyes, which are conspicuously emarginate opposite the shoulders and in male contiguous above middle of frons, interfrontalia largely obsolete, parafrontalia linear, with about 6–8 small setae, which do not reach middle; vertex of female three-tenths head-width, interfrontalia dull fuscous, strongly narrowed anteriorly, frontal triangle broad and with strongly convex sides, thus 'ogival', not or hardly reaching anterior third of frons, parafrontalia glossy, less than a sixth frontal width behind middle but widened to a third frontal width at lunula, with *c.* 6–8 small inclinate setae extending to behind middle, a small proclinate seta at upper third and two small reclinate setae above; ocellars distinct but rather small, verticals in male indistinct, in female short but quite conspicuous. Antennae and palpi fuscous, arista slightly paler on apical half of incrassate part. *Thorax* with 1+1 *acr*, the *prst* ones close to suture, much closer to each other than to the *dc*, the *acr* hairs in about four rows, separated from the *dc* by a broad bare strip; 2+4 *dc*, the anterior *post* one weak. *Abdomen* with very short hairs, in male these are erect and dense on dorsum of proximal two segments as if shorn. *Wings* subhyaline with pale testaceous veins, membrane with bare areas, especially in the costal cells and on two basal streaks of the discal cell. Calyptrae brown, including border and fringe, in female paler, especially laterally. *Legs* piceous-black, tarsi wholly dark; mid femur of male at base with 2–3 short erect spine-like setae ; hind femur of male with 1–2 similar spine-like setae near base, in female instead with a long setulose hair, in both sexes with some *av* setae on apical third; hind tibia with a strong *pd* seta slightly beyond middle, and in female normally with only one *av*, which is placed well beyond middle, in male with numerous long *av*, *v* and *pv* hairs, these are only moderately long on *v* surface, long and less numerous on *av* surface, and very long on *pv* surface, especially near middle of length.

Length.—4·8–5·4 mm., of wings 4·4–4·9 mm.

Distribution.—CEYLON. MALAYA. JAVA. SUMATRA. CHINA and E. SIBERIA to NEW HEBRIDES and AUSTRALIA.

The hairs on the wing membrane will apparently supply a

possibility for distinguishing geographical races, and according to Sabrosky the hairs of the male hind tibia also indicate that several forms are united under *nigra* at present.

135. **Ophyra capensis** (Wiedemann).

(Figs. 82*a*, *b*)

1818. *Anthomyia capensis* Wied., *Zool. Mag.*, I, 2, 46; 1830, *Aussereur. zweifl. Ins.*, II, 426. Type: Cape. Mus. Vienna ?

1826. *Anthomyia anthrax* Meig., *Syst. Beschr. eur. Ins.*, V, 161. Types: Europe. Mus. Paris ?

1913. *Ophyra caerulea* Brun., *Rec. Ind. Mus.*, VIII, 171 (♂ ♀) Types: Rotung, N.E. Frontier. n. syn. ? (in Zoological Survey of India, Calcutta) ?

Glossy bluish- or greenish-black, without brown dust, except for a little above the wings, on lower margin of scutellum and on the abdomen. *Head* (Fig. 82*a*) with very large eyes, which are conspicuously emarginate opposite the shoulders and in male subcontiguous above middle of frons, interfrontalia linear or obsolete near middle, parafrontalia linear except in front, glossy, with about 6–10 fine inclinate setae, which reach about middle; vertex of female about one-third head-width, interfrontalia dull fuscous-brown, strongly narrowed anteriorly, frontal triangle broad and with strongly convex sides (Fig. 82*b*), ' ogival ', almost or fully reaching lunula, more than twice as long as wide, parafrontalia glossy, widened to almost a third frontal width at lunula, with *c.* 5–7 small inclinate setae extending to behind middle, a small proclinate seta at three-fifths, and two small reclinate setae above; ocellars distinct but rather thin, verticals in male indistinct, in female short but conspicuous. Antennae and palpi fuscous-brown. *Thorax* with 1+1 very fine *acr*, the *prst* ones approximated and close to suture, the area between the *dc* otherwise evenly beset with fine rather long half-erect hairs; 2+4 very fine *dc*, only the last one more conspicuous. *Abdomen* with rather short and decumbent hair, which becomes longer and more erect towards sides and apex. *Wings* as in *nigra*. Calyptrae whitish, including border and fringe. *Legs* piceous-brown, tarsi wholly dark; mid femur of male near base with 2–3 short erect spine-like setae; hind femur with only a long erect hair at base and with 4–6 long (especially in male) *av* setae on less than apical half, hind tibia with a strong *pd* seta at middle (and sometimes a small one basad or proximad), and in female normally with 2–4 *av* setae (seldom only 1) and in male a row of long bristles on about apical two-thirds of *av* and *pv* surfaces.

Length.—4·4–5·3 mm., of wings 4·4–4·8 mm.

Distribution.—C. and S. EUROPE. CANARY IS. N. AFRICA. ETHIOPIAN REGION. CEYLON. INDIA (from the Tanjore

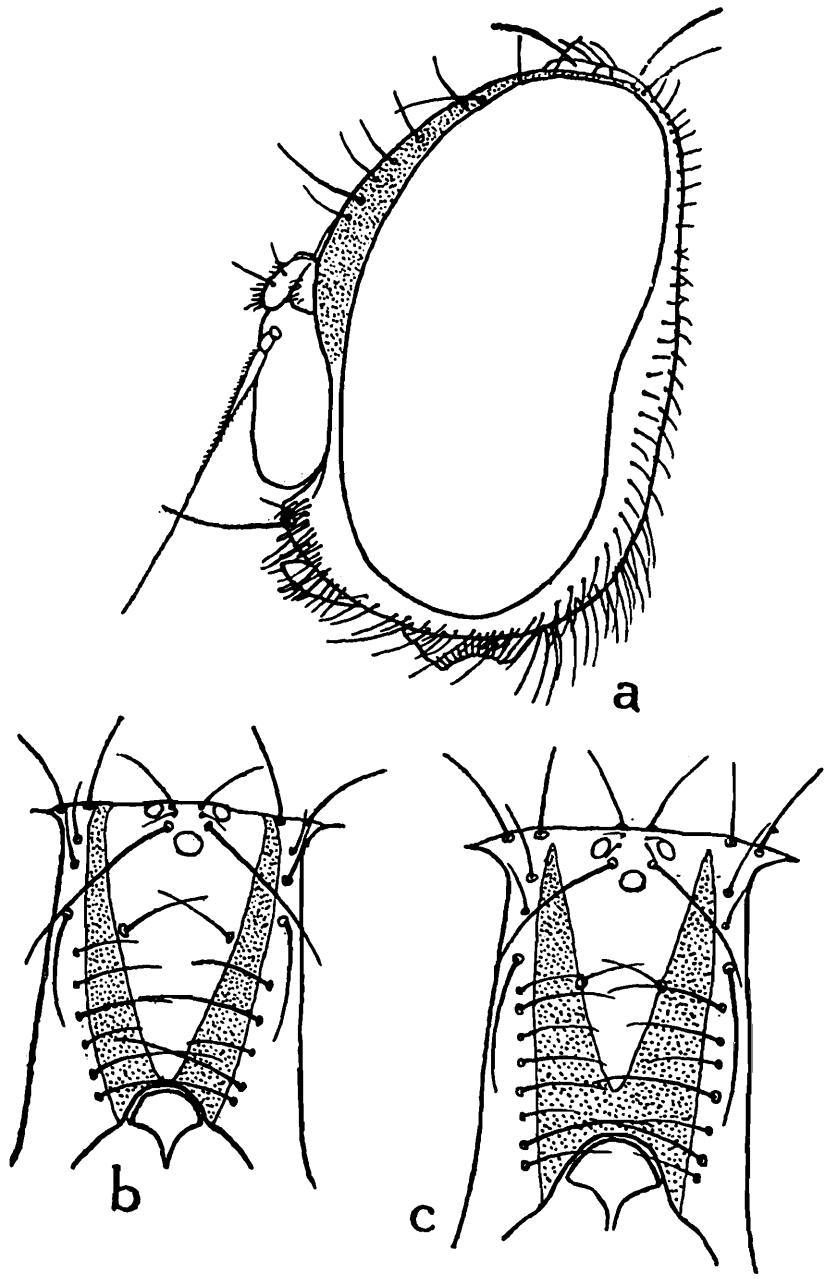


FIG. 82. *Ophyra capensis* (Wied.). *a*, side view of head of female. *b*, anterior view of its frons. *c*, *Ophyra leucostoma* (Wied.), anterior view of frons.

District to the U.P. and to Bengal and—'*caerulea*'—the N.E. Frontier).

Brunetti's description of *caerulea* does not contain any of the characters which are important for distinguishing the species in this genus, but the blue colouration of the body indicates that the species is similar to, and possibly identical with, *capensis* Wied. Brunetti himself says, 'that it is near,

but quite distinct from, the European ' *capensis*. However, the distinctive features which he saw were obviously only those of colouration mentioned in his description. *O. capensis* specimens with reddish translucent shoulders are quite frequent, though I have not seen specimens with a 'cream-yellow' spot on the shoulders or with 'dull yellowish-brown' legs. However, the female of Brunetti's typical pair is said to have 'the humeri darkened', thus being apparently less immature than the male.

136. **Ophyra obscurifrons** Sabrosky.

1949. *Ophyra obscurifrons* Sabr., *Proc. Hawai. ent. Soc.*, **XIII**, 424, 426, 430. Type: Tsinan. Mus. Washington.

Exactly fitting the description of *O. capensis* except for the more extended and more conspicuous brown pollinosity, which covers the parafacialia, parafrontalia and frontal triangle, rendering them dull or only slightly shining. On the thorax it is present on the whole of the scutellum, the whole of the postalar callosities (which in *capensis* are largely undusted), the notopleurae, shoulders and the declivous parts in front of suture.

Distribution.—INDIA: Sadiya, Assam. CHINA: Shantung (Tsinan); Ningpo; Szechuan (Suifu; Kuanshien); Tientsin (?). OKINAWA Is. HONG KONG (!). S. ANNAM; Langbian Prov. (!).

It is not known whether the hind margin of the eye is emarginate in the Tibetan *O. hirtitarsis* Stein, the male of which has only a single *ad* and *av* seta on the hind tibia. Otherwise that species is very similar to *obscurifrons*.

Genus 28. **Hydrotaea** Robineau-Desvoidy.

1830. *Hydrotaea* R.-D., *Myod.*, 509. Genotype: *meteorica* L.
1919. *Parahydrotaea* Stein, *Arch. Naturgesch.*, **LXXXIII**, A, 129. Genotype: *jacobsoni* Stein. n. syn.

Head with the eyes bare or hairy, in male contiguous to narrowly separated, in female widely separated, frons in female (Fig. 84) with a pair of cruciate interfrontal, one proclinate and two reclinate orbital setae, the posterior reclinate being the stronger; frontal triangle not reaching lunula (in Oriental species), more or less dusted, with concave sides, pore of cruciate interfrontal setae not contiguous with its sides; lunula with conspicuous silver-white dust. Arista bare to short-haired, hairs up to about twice length of the

basal diameter. *Thorax* with more or less conspicuous dust, never glossy bluish-black, with 4 *post dc*, *pra* small or absent; prosternum, propleural depression, pteropleura and hypopleura without setules; 1+1, seldom 1+2, *stpl.* *Abdomen* ovate (♂) or triangularly subcordate (♀), with moderately strong setae only laterally and at apex. *Wings* (Pl. 2, fig. 19) hyaline in Oriental species, *sc* only slightly and gradually curved forward, not sinuous, unusually straight from shortly behind *h* to tip; r_{4+5} and *m* markedly converging at apex, without setulae, sixth and seventh veins rather long, their apices not or hardly converging. Halteres fuscous (in Oriental species). *Legs* of normal length; fore femur of male (Fig. 83) with distinctive pre-apical *v* teeth, spines or spine-like setae; mid femur with 2–3 strong *p* to *pd* and 1–2 small *ad* pre-apicals, mid tibia (in Oriental species) without an *av* seta; hind tibia with or without a *pd* seta beyond middle ('*Phaonia* calcar').

Distribution.—Mainly HOLARCTIC, about a dozen species each in the ETHIOPIAN and ORIENTAL REGIONS, and a few in the AUSTRALIAN and NEOTROPICAL REGIONS.

Biology.—Some European species belong to the most persisting and irritating ('*irritans*') sweat-flies; they are also found on flowers, foliage, decaying matter, etc., and often perform mating dances under big trees or in the wind shelter of hedges. In addition to sweat, adults suck up moisture of dung, blood oozing from wounds, etc. Eggs without flanges, deposited on and near dung and probably other decaying matters. First two larval stages saprophagous, third stage very effectively predacious on other Dipterous larvae, especially *Musca* and *Stomoxys*, sometimes causing external or internal (intestinal) myiasis. Pupa in dung or in the ground (Keilin, 1917, *Parasitol.*, **IX**, 399–405; Hammer, 1941, *Vidensk. Medd. Dansk nathist. For.*, **CV**; Séguy, 1938, *Bull. Ass. Natur. Loing*, **XXIII**, 58).

As the female of *Parahydrotaea* cannot be distinguished from those of *Hydrotaea*, Stein's genus can hardly be maintained, being based on nothing but a small difference in the secondary male characters. *H. nitidiventris* Mall. (1926, *Treubia*, **VIII**, 341) from Sumatra has a strong *pd* seta on the hind tibia but bare eyes, thus being intermediate between the two groups of the key below; it differs from *dentipes* by the absence of the *pra*. *H. spinosa* Stein (1907, *Ann. Mus. zool. Ac. Sci.*, Petersburg, **XII**, 331) from Tibet will be traced to the second group, but it has only 3 *post dc*, and its hind tibiae are beset with about 5 *pd* setae, which increase in length from base towards apex (4 *post dc* are an important generic

character of *Hydrotaea*, but specimens with only 3 *post dc* on one side have been found. Stein's species, of which he has seen four specimens, is the only exception to this rule, and this was fully realized by Stein). Further Oriental species are *bicolor* Dol. from Amboina (with pale abdomen and tarsi) and *calcarata* Loew from Japan.

Key to the species of Hydrotaea.

1 (14) *pd* seta of hind tibia indistinct or at any rate hardly longer than greatest tibial diameter. Only the *prsc acr* somewhat stronger. Eyes virtually bare, even in male, where they are contiguous.

2 (13) Mid tibia without an *ad* seta (♂ ♀).

3 (4) ♂: Fore femur (Fig. 83*a*) not emarginate near apex of *v* surface, where 3–5 straight erect spine-like setae are situated. ♀: Frontal triangle largely polished, only tip and median line somewhat dusted; parafrontalia undusted outward of the frontal setae. ♂ ♀: *pra* absent. Longest hairs of arista not longer than its basal width. Notopleura without hairs. *jacobsoni* (Stein), p. 312

4 (3) ♂: Fore femur with a pre-apical *v* emargination and at the proximal end of the emargination with a pair of teeth (Fig. 83*c*) or with a compressed dagger-like spine and a simple spine-like seta beyond it (Fig. 83*b*). ♀ (as far as known): Frontal triangle dusted; parafrontalia more or less extensively dusted.

5 (12) Notopleura bare or hairy, in the latter case arista distinctly short-haired, longest hairs as long as its basal diameter. ♂: Fore femur of *meteorica* type (Fig. 83*b*), *i.e.* with dagger-like spiniform seta, the basal part of which is strongly compressed, whereas the apex is drawn out into a fine point, and with a spiniform seta of similar length just beyond it (both structures situated in setiferous pores). (♂ of *malaisei* unknown).

6 (9) Notopleura bare (apart from the two setae). ♂: Hind femur with only 2–3 *av* setae, which are situated on apical fourth.

7 (8) More densely dusted, especially the female, the parafrontalia of which are densely dusted brownish-grey and quite matt. ♂: Hind tibia without *pv* setae on apical fourth; mid femur on more than basal half with 4–5 pointed strong setae, which are almost or fully as long as width of femur — *australis* Mall., p. 314

8 (7) Thinly dusted, parafrontalia of female subshining, but distinctly dusted as though shagreened. ♂: Hind tibia on apical fourth with a row of 4–5 *pv* setae, which are 2–3 times as long as tibial diameter; mid femur on more than basal half with a row of about 12 short setae, most of which are hardly half as long as width of femur, and the tips of which are only shortly pointed and bent towards apex of femur. . . . . — *affinis* Karl, p. 315

9 (6) Notopleura with fine erect hairs in addition to the two setae.

10 (11) Basal half of hind femur with *av* setae (♂ ♀). r_1 not quite reaching level of *r-m*. ♂: Very hairy; hind femur with a complete row of rather dense long and fine *av* setae, most of which are almost or fully twice as long as width of femur; basal half of mid femur with a dense row of fine *pv* setulae, which are about as long as width of femur. ♀: Frons at lunula two-fifths head-width, interfrontalia 9–10 times width of a parafrontale. — *cilifemorata* sp. n., p. 317

11 (10) Basal half of hind femur without *av* setae. r_1 reaching level of *r-m*. ♀: Frons at lunula not much more than a third head-width, interfrontalia 5–6 times width of a parafrontale. — *malaisei* sp. n., p. 319

12 (5) Notopleura with a few fine erect hairs in addition to the two setae, and arista very short-pubescent, hairs decumbent and only up to half as long as basal diameter of arista. ♂: Fore femur with the normal two teeth (*see* Fig. 83*c*), which are rigidly fused with femur; fore and hind femora with 1 (at base and beyond middle respectively); mid femur with 4–6 unequal erect very strong blunt-tipped almost drumstick-like setae, fore tibia with a *pv* row of long

setulae on apical half; hind tibia with a row of very long setulose *av* hairs on more than apical half, intermediate third somewhat swollen and with an erect brush of dense strong setulose *v* hairs, more than apical half of *v* surface with fine half-erect shorter hairs. ♀: Parafrontalia and frontal triangle densely dusted grey, on the latter the dust usually somewhat thinner in front of anterior ocellus ... *armipes* (Fln.), p. 320

13 (2) Mid tibia with a strong *ad* seta at apical third (probably in ♂ ♀). ♂: Base of anterior femora with some strong erect spine-like setae, fore femur (Fig. 83c) with a sharp *pv* tooth at apical fourth and a stronger but much more rounded *av* tooth slightly basad; distal three segments of mid tarsus dilated and with longish *av* and *pv* hairs; basal half of hind femur with a fringe of dense erect somewhat curved hairs; hind tibia with a short row of long erect *v* hairs at middle .. .. *atrisquama* Ringd., p. 321

14 (1) *pd* seta of hind tibia more than twice length of greatest tibial diameter. Jowls with some conspicuous upcurved setae on anterior part.

15 (16) *pra* present, at least as long and strong as second *npl* or eyes bare, even in male. 1+2 *stpl.* Several *prst* and *post acr.* Jowls with a very strong upcurved seta. ♀: Parafacialia with dense whitish dust; frontal triangle glossy black. *dentipes* (F.), p. 323

16 (15) *pra* absent. Eyes densely long-haired, the hair more or less conspicuous even in female. 1+1 *stpl*, the third seldom distinct.

17 (20) 2–3+3–5 *acr.* *m* only slightly upcurved at apex.

18 (19) Wing length 4–5 mm. Jowls with several moderately strong upcurved setae. Notopleura bare apart from the two setae. Thorax conspicuously dusted with pale-grey and brown-grey vittae. ♂: Eyes contiguous; apical half of all tibiae with rather long half-erect hairs on *v* and *pv* surfaces; base of hind femur with a large erect *v* spine, the apex of which is stunted and crotchet-like. ♀:

Frontal triangle and upper part of parafacialia undusted, glossy .. *occulta* (Meig.), p. 325

19 (18) Wing length 5·5–6 mm. Jowls with 1 strong upcurved seta. Notopleura with dense erect hairs in addition to the two setae. Thorax inconspicuously dusted brown. ♂: Eyes separated by width of third antennal segment; only fore tibia with somewhat longer half-erect hairs on *v* surface of apical third; hind tibia with an *av* and *pv* row of moderately strong setae on more than basal two-thirds; base of hind femur without a *v* spine or seta. ♀: Frontal triangle and upper part of parafacialia dusted, matt. . *cyrtoneurina* (Zett.), p. 326

20 (17) 1+1 strong *acr.* *m* conspicuously upcurved at apex. Wing length 7–8 mm. Notopleura hairy. Thorax with rather conspicuous whitish-dusted and fuscous vittae. *lasiopa* sp. n., p. 328

137. **Hydrotaea jacobsoni** (Stein)

(Fig. 83*a*)

1919. *Parahydrotaea jacobsoni* Stein, *Arch. Natgesch.*, **LXXXIII**, A 1, 129. Type: Samarang. Mus. Amsterdam or Leyden?

♂ ♀: Piceous-black and piceous-brown with thin greyish-brown dust, third antennal segment brown, densely dusted greyish-white. *Head* rather densely dusted brownish-grey, parafacialia glossy piceous at level of second antennal segment, the glossy area in female extended over most of parafrontalia; eyes bare, in male contiguous on intermediate third of frons, interfrontalia broadly triangular on anterior two-fifths, otherwise obsolete, parafrontalia linear, only slightly wider near lunula, so that hardly a glossy line is left at the outer side of the setal pores, with six fine inclinate setae on anterior third, otherwise bare, ocellars almost hair-like, verticals indistinct; eyes in female separated by a quarter head-width at vertex and by almost or quite a third at lunula, frontal triangle glossy with the apex thinly dusted (appearing shagreened), the dusted area triangularly pointed behind and narrowly drawn out in front to anterior quarter of frons, this extension more densely dusted and poorly defined, interfrontalia 6–8 times width of a parafrontale at middle, somewhat narrowed in front and behind, parafrontalia narrow, somewhat broadened in anterior third, with 5–6 not very strong inclinate setae on anterior half, ocellars strong, verticals

moderately strong; parafacialia longitudinally concave and obsolescent from level of arista downward, jowls two-thirds width of third antennal segment, the latter falling short of mouth-margin by half (♀) or fully (♂) its own width; arista thin, extremely short-haired, the longest hairs shorter than its basal width. *Thorax* thinly dusted, only the notopleurae and posterior part of shoulders and the area in front of scutellum somewhat more conspicuously dusted, inner anterior part of shoulders light brown or testaceous translucent (the dark colouration sometimes tapering out in points as in

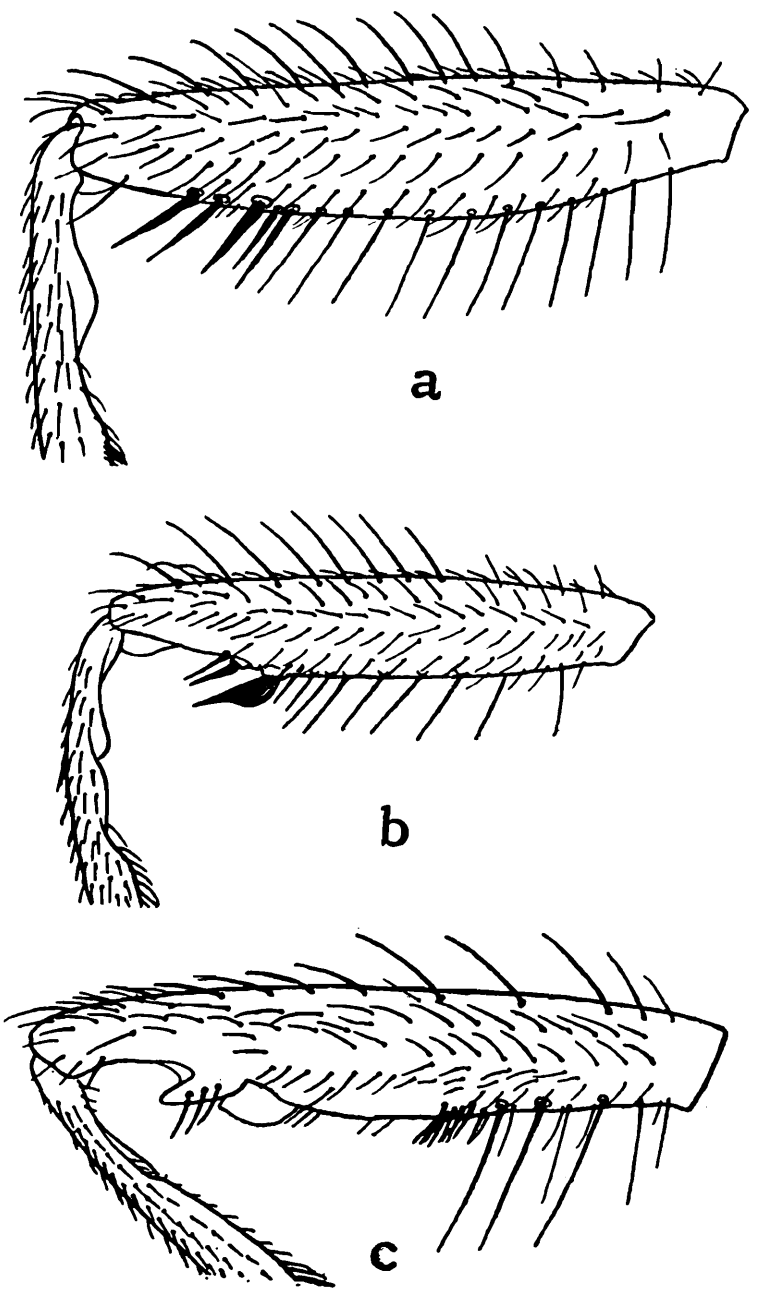


FIG. 83. Posterior view of apical part of male front femur and base of tibia of (*a*) *Hydrotaea jacobsoni* (Stein); (*b*) *Hydrotaea australis* Mall.; and (*c*) *Hydrotaea atrisquama* Ringd.

australis ♂; but then all vittae extended to level of hindmost *dc*), about 3+6–8 small *acr* the rows of which are closer to each other than to the *dc*, 2 moderately strong *ia*, *pra* hair-like; propleural and prostigmal rather strong, anterior mesopleural conspicuous, disc of scutellum with a bare median strip and similar dorsolateral strip. *Abdomen* short-ovate in male, subtriangular, markedly pointed in female, evenly dusted brownish-grey, in male with a rather broad tapering dark median vitta. *Wings* subhyaline, in male with a slight brownish tinge, membrane evenly haired, veins pale testaceous; r_1 not exceeding level of *r-m*, *m-m* almost straight, rather upright, meeting *m* at almost right angles. Calyptrae in male brownish subopaque with brownish border and fringe, in female greyish-yellow subopaque with dull yellow border and fringe. *Legs* piceous, greyish-dusted; fore femur of male (Fig. 83*a*) with 3–5 straight, spine-like black *pv* setae at apical fifth, without a pre-apical *v* emargination, fore tibia of male with a basal *v* emargination followed by an oblique shining compressed tubercle and another emargination just basad of middle, in both sexes without a submedian seta; mid femur with a row of short half-erect *a* setae on basal half and with or without 2–3 very small *av* setae near base, mid tibia with 2–3 *p* setae; hind femur with a rather dense row of short *ad* setae, some small *ad* (almost *d*) and *d* setae near apex and in male 6 long, rather closely set, in female 3 strong, *av* pre-apicals preceded in female by 1–2 small *av* setae further basad, hind tibia with a very small *pd* seta, an *ad* at middle, and 2 *av* setae slightly beyond, in male in addition with a complete row of fine equal *ad* setulae and, in apical half, a row of long fine setulose *pv* hairs and about 4–6 *av* setae.

Length.—3·2–5 mm., of wings 3·8–4·2 mm.

Distribution.—CEYLON. MALAYA: Kuala Lumpur, Selangor; Jerantut, Pahang. JAVA: Samarang (type). FORMOSA.

Biology.—The Kuala Lumpur specimens were collected in a cattle shed.

Stein describes the calyptrae as yellowish. In this regard the males at hand (from Ceylon and Kuala Lumpur) appear to differ slightly.

138. **Hydrotaea australis** Malloch.

(Fig. 83*b*)

1923. ! *Hydrotaea australis* Mall., *Ann. Mag. n. H.* (9), **XI**, 667. Type: S. Queensland. B.M.

♂ ♀: Extremely similar to *H. jacobsoni* but somewhat more

dusted than the same sex of *jacobsoni*, male with posterior half of mesonotum rather densely dusted grey-brown, seven contiguous undusted dark vittae extending from suture backward and tapering off at hind end, the median one reaching level of second *post dc*, the next one almost that of third, the other two exceeding third *post dc* and more conspicuously separated by brown dust which reaches forward to beyond anterior *ia*. *Head* rather densely dusted greyish-brown (♂) or brownish-grey (♀), interfrontalia of male less broadened anteriorly, of female more parallel-sided, parafrontalia (♂ ♀) with only 3–5 inclinate setae, conspicuously dusted outward of these, frontal triangle of female everywhere dusted, only slightly shining, not exceeding anterior third of frons. *Thorax* and *abdomen* as in *jacobsoni* except for the slight pattern of the male thorax, in female uniformly and more densely dusted. *Wings* and calyptrae as in *jacobsoni* but calyptrae of male pale brownish-grey. *Legs* piceous-brown; fore femur of male (Fig. 83*b*) with a shallow preapical emargination and basad of it two stout black spines, which are directed more apicad than ventrad and shaped almost exactly as in *H. meteorica*, i.e. the distal spine simple and shorter, the proximal spine compressed and dilated (even more so than in *meteorica*) in more than basal half, the double emargination and tubercle of the fore tibia much weaker than in *jacobsoni*; legs otherwise as in *jacobsoni*, but *pd* seta of hind tibia usually indistinct and the male with 2 half-erect *pv* setulae at middle of hind tibia.

Length.—2·1–3·5 mm., of wings 2·7–3·7 mm.

Distribution.—CEYLON. MALAYA: Kuala Lumpur, Selangor. AUSTRALIA: S. Queensland; N.S. Wales.

Biology.—The Kuala Lumpur specimens were bred from cow-dung by Dr. E. P. Hodgkins, and others were found by him in a cattle shed. Some specimens of both sexes sent from N.S. Wales were labelled 'about cows', according to Malloch.

The Malayan specimens differ in no way from the typical series from Queensland.

139. **Hydrotaea affinis** Karl.

1935. *Hydrotaea affinis* Karl, *Arb. morph. taxon. Ent.*, II, 38. Type: Tainan. Deut. Ent. Inst.

Piceous-black with thin dark brown dust, only slightly shining, abdomen with more conspicuous brownish-grey, and in some places bluish-grey, dust and an undusted glossy median vitta, which is rather broad on second segment;

arista, tibiae and posterior femora piceous-brown. *Head* rather densely dusted greyish-brown below and on face, parafrontalia and uppermost part of parafacialia moderately shining (the former thinly dusted brown and appearing sha-greened); eyes bare, in male contiguous and with somewhat larger anterior facets, interfrontalia and parafrontalia obsolete in upper three-fifths, the former visible as a moderately broad triangle in anterior third, the parafrontalia gradually somewhat widened in anterior two-fifths, where 5–6 not very strong inclinate setae are present, ocellars rather small, inner and outer verticals very fine and small; frons of female a quarter head-width (at vertex, gradually dilated with somewhat concave sides to lunula where it is almost a third (0·32) head-width), interfrontalia gradually somewhat narrowed anteriorly, six times as wide at middle (and thrice as wide at anterior extremity) as a parafrontale, the latter with 4–5 rather weak inclinate setae on anterior half, ocellars and verticals rather small; parafacialia obsolete in profile, jowls two-thirds (♂) or one-half (♀) width of third antennal segment. The latter falling short of mouth-margin by half its own width; arista short-pubescent, longest hairs not longer than its basal width. *Thorax* with two rows of rather short *acr* (which are slightly less widely separated from each other than from the *dc*), otherwise as in *jacobsoni*, scutellum with sparse hairs, without marked bare strips. *Abdomen* as in *jacobsoni*. *Wings* with a brownish tinge and brown veins in male, hardly tinged and with pale testaceous veins in female; r_1 slightly exceeding (♂) or just reaching (♀) level of *r-m*, which lies at two-thirds of discal cell, *m-m* slightly oblique and hardly sinuous. Calyptrae brown with darker brown border and fringe in male, yellowish with darker yellowish border and pale golden fringe in female. *Legs* rather slender in male; fore femur as in *meteorica* L. with the main spine somewhat stouter, fore tibia with a much deeper double emargination opposite the spines; mid femur with a fringe of long setulose hairs on *p* surface and with the row of *pv* setae extending over basal three-fifths and consisting of rather blunt short setae, mid tibia with 2–3 strong *p* setae; hind femur with the *av* setae restricted to 2–3 short ones near apex, hind tibia with numerous short half-erect hairs on *a* and *ad* surfaces, 4–5 long setulose hairs on apical fifth or fourth, and 4 fine and short half-erect hairs near middle, of *pv* surface. In female the fore legs are simple, the mid femur has no *pv* setae and a weak *p* fringe only on apical half, and the hind tibia has no outstanding setulose hairs but the normal *ad* and 2 *av* setae.

Length.—4–5 mm., of wings 3·7–4·6 mm.

Distribution.—FORMOSA (types). S. INDIA (Narikkudü, Tinnevelly District, 1 ♂ ; Walayar Forest, S. Malabar, 1 ♀).

The characters in (♂) contradict to some extent Karl's description, the only more important discrepancy concerning the rows of the *prst acr*, which in females are more widely separated from each other than from the *dc*. Possibly the only female referred by me to *affinis* belongs to a different species. The *meteorica* group (as characterized by the structure of the male fore femur) contains a number of very similar species, and in spite of the identical *pv* setulae of the hind tibia it is by no means quite certain that even the male is conspecific with Karl's species.

140. **Hydrotaea cilifemorata** sp. n.

(Fig. 84)

♂ ♀ : Piceous-black with very thin brown dust, abdomen of male moderately densely dusted grey with a slight bluish tinge in places, a rather narrow dark median vitta and dark brown dusted incisures; abdomen of female evenly dusted brownish-grey, more shining on anterior part. *Head* (Fig. 84) dusted brownish-grey, dust of parafacialia in male more silver-grey; in male eyes closely contiguous, with markedly enlarged upper anterior facets, interfrontalia fuscous-brown, only anterior third visible as a rather broad triangle, parafrontalia obsolete except for anterior two-fifths, which are narrow and

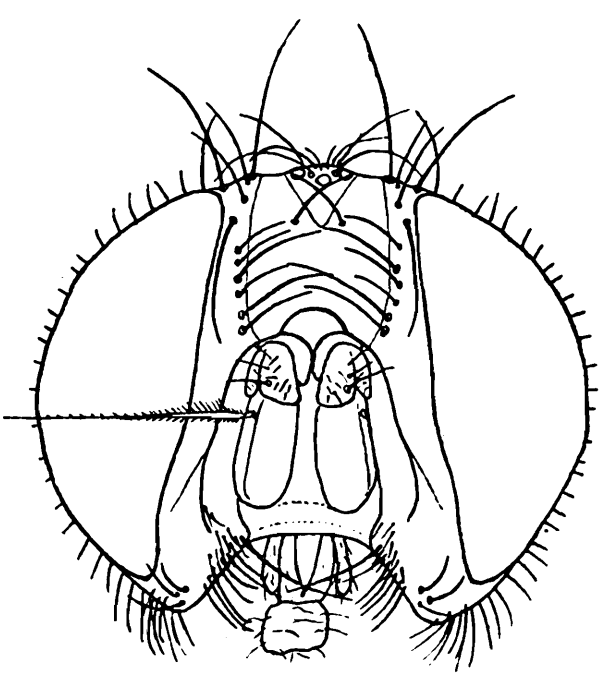


FIG. 84. *Hydrotaea cilifemorata* sp. n., head of female.

slightly widened to lunula, carrying 9–10 long but rather fine and irregular inclinate setae, ocellars long and rather fine, verticals very fine, not distinguishable from the fine and rather long setulae of the occipital row; head of female with a large glossy spot on upper part of parafacialia; frons at vertex one-third (0·31–0·34) head-width, moderately widened with somewhat concave sides to lunula, where it is two-fifths (0·39–0·41) head-width, frontal triangle thinly but distinctly dusted, almost reaching middle, its apex indistinctly drawn out further, interfrontalia with very thin brown dust, matt, somewhat narrowed to extremities, 9–10 times as wide at middle as a parafrontale, with 5–6 uneven inclinate setae on lower half, ocellars long and rather strong, verticals strong but only moderately long; parafacialia rather markedly and evenly prominent in profile, half as wide, jowls as wide, as third antennal segment, anterior upper part of jowls with about 6 (♂) or 2–3 (♀) fine upcurved setae. Third antennal segment falling short of mouth-margin by half (♀) or almost (♂) its own width; arista pubescent, more conspicuously so on basal half where the longest hairs of the dorsal surface are half as long again as basal diameter of arista though rather decumbent. *Thorax* without a marked pattern, though in female with the beginning of faint paramedian vittae in front, male with long erect fine hairs, *acr* in 4–5 irregular rows, the outer pair containing several rather short setae both in front and behind suture, 2 rather strong *ia*, *pra* absent in male, small or indistinct in female; propleural well developed, lying on a marked prominence, which in male also bears an adjacent tuft of long setulose hairs, prostigmal not very strong in female and indistinct among group of numerous long setulose hairs in male, anterior mesopleural weak in male, well developed in female. *Abdomen* in male with rather dense long erect hairs and, on second to fourth, especially third, segment, row of long marginal setae, in female with decumbent setulose hairs and a row of stronger decumbent marginal bristles, especially on third segment. *Wings* hyaline with light brown veins, which become paler at base; apex of r_1 not fully reaching level of *r-m*, which lies beyond two-thirds (♂) or three-fifths (♀) of discal cell. Calyptrae of male brownish subhyaline, with brownish border, of female yellowish subhyaline with pale testaceous border. *Legs* piceous-brown; fore femur of male armed as in *meteorica*, the main spine somewhat more dilated, tibia with stronger emarginations near base, in both sexes without a *p* seta; mid femur of male with fine rather long erect hairs on *pv* (and *p*) surfaces without any setae except the pre-apicals

but with a *p* fringe of long setulose hairs, which is more weakly developed in female, mid tibia with 2 strong *p* setae; hind femur with a complete row of *av* setae, which in female are not very numerous and short except for 3–5 strong ones near apex, and which in male are numerous, very long and fine with a weaker row ventrad, the *v*, *pv* and *p* surfaces in male with dense fine erect hairs, hind tibia with an *ad* seta at middle and in male a fringe of half-erect *ad* hairs in basal half (this fringe vestigial in female), a small *pd* seta beyond middle, and in female an *av* seta towards apical third, in male 2–3 setulose *av* hairs towards apex.

Length.—4·5–4·9 mm., of wings 4·7–5·1 mm.

Distribution.—N. INDIA: Mundali, Jaunsa Division, Dehra Dun dist., 9,000 ft., 12.V.10 (*Museum collector*), ♂ type 2 ♀ paratypes (in Zoological Survey of India, Calcutta), 2 ♀ paratypes (B.M.).

The male differs from the related European species *meteorica* L. and *cinerea* Meade by the absence of any strong setae from the *v* surfaces of the mid femur.

141. **Hydrotaea malaisei** sp. n.

(Pl. 2, fig. 19)

♀: Shining fuscous-black with very thin greyish-brown, somewhat uneven dust. Extremely similar to the female of *cilifemorata*, from which the present females differ only by the narrower frons (at vertex 0·30–0·32, at lunula 0·34–0·37 times head-width), with straight sides, the more extensively glossy parafrontalia, the glossy outer part extending from the parafacial spot almost to the pores of the inclinate setae and ascending to middle of frons, less wide interfrontalia, which are 5–6 times as wide at middle as a parafrontale; *prst acr* all hair-like, of the 2–3 *post acr* setae only the *prsc* pair conspicuous; *pra* small but very distinct; anterior mesopleural small. r_1 (Pl. 2, fig. 19) just reaching level of *r-m*; hind femur without any outstanding *av* setae on more than basal half but with 3 strong ones on apical two-fifths, a small seta usually placed between the more widely separated proximal two of them.

Length.—3·7–5·0 mm., of wings 4·2–4·9 mm.

Distribution.—N.E. BURMA: Kambaiti, 2,000 m., 6.IV.34 (*R. Malaise*), ♀ type (Mus. Stockholm), 4.IV.–7.VI.34, 27 ♀ paratypes (Mus. Stockholm, Helsinki and B.M.).

These females are so closely related to those of *H. cilifemorata* that the males must be assumed to have fore femora

of the *meteorica* type like *cilifemorata*. The *pra* will probably be distinct in the male as in the females.

142. **Hydrotaea armipes** (Fallén).

1824. *Musca armipes* Fln., *Monogr. Musc. Sueciae*, 75. Type: Skåne. Mus. Stockholm or Lund.

1954. *Hydrotaea armipes* (Fln.), Ringdahl, *Svensk Insektfn.*, **XI**, 1, 1, 61.

Piceous with thin brownish (♂) or brownish-grey (♀) dust, mesonotum without or with 4 faint vittae, abdomen of male more thickly dusted grey with an undusted median vitta, which is rather broad on first segment, narrow on second and very narrow on third, fading out towards tip of abdomen, female abdomen uniformly and not very thickly dusted brownish-grey. *Head* with silver-white (♂) or whitish-grey (♀) dust on parafacialia and most of parafrontalia, otherwise moderately thinly dusted brownish-grey; eyes virtually bare, in male contiguous, interfrontalia obsolete at middle but visible as a minute elongate triangle towards anterior ocellus and as a small triangle above lunula, parafrontalia linear, somewhat widened in anterior third where 5–8 inclinate setae are present, ocellars fine, verticals very fine and rather indistinct; frons of female at vertex about a third (0·33–0·35) head-width, slightly dilated with straight or somewhat concave sides to lunula where it is 0·35–0·37 times head-width, frontal triangle not reaching middle, conspicuously dusted but often somewhat shining close to each ocellus, interfrontalia fuscous or reddish-fuscous, thinly dusted brown, somewhat narrowed to extremities, 4–5 times as wide at middle as a parafrontale, the latter with 4–6 inclinate setae on anterior half, ocellars and verticals rather strong; parafacialia half (♂) or a third (♀) as wide, jowls as wide, in profile as third antennal segment. The latter falling short of mouth-margin by fully its own width, arista very short-pubescent, hairs decumbent, longest ones half as long as its basal diameter. *Thorax* with several pairs of weak *prst* and *post acr*, 1 pair close to suture and 2–3 towards scutellum somewhat stronger, the rows almost or quite as widely separated from each other as from the *dc*, some small hairs in about 2 longitudinal rows between them; both *ia* well developed, *pra* absent; anterior mesopleural small or indistinct; disc of scutellum with sparse hairs. *Abdomen* with decumbent, in male towards sides with long erect hairs, which are not very dense, lateral part of hind margins with distinct, though not very strong, marginals, which are long and rather conspicuous on fourth segment,

hypopygium with rather dense erect setulose hairs, fourth ventrite of male as long as tergite, convex and somewhat prominent, with a rather small triangular apical excision which produces two very short broad rounded lobes. *Wings* greyish subhyaline with pale testaceous veins, apex of r_1 reaching level of *r-m*, the latter beyond two-thirds (♂) or near three-fifths (♀) of discal cell. Lower calyptra greyish-white subopaque with yellowish border. *Legs* piceous-brown; in male *v* surface of fore femur in addition to the 1–2 long drumstick-like basal setae with a row of short stiff blunt setae, the row ending in a dense comb of 6–8 of these setae basad of the *av* tooth, which is sharp and pointed, *pv* surface with 5–6 somewhat longer blunt-tipped setae on basal two-fifths, and with a dense row of 5–8 not very long pointed setae close to the *pv* tooth, which is also sharp and pointed, fore tibia with a long *v* emargination extending over basal half and with short erect *v* hairs and a row of long erect setulose *pv* hairs on apical half; mid femur with 2–3 *v* and 2–3 *pv* drumstick-like setae, the middle *v* one being the strongest and the distal *v* one—at middle—being a more or less normal seta, *a* surface with a fringe of long setae on basal, and of short setulose hairs on apical, half, *p* surface with a fringe of rather long setulose hairs, mid tibia with a row of fine erect setulose *ad* hairs, which are almost or fully as long as tibial diameter, and 1–2 *p* setae near middle; hind femur in addition to the drumstick-like seta with 2–3 moderately strong *av* setae near apex, 3–5 of the setulose *av* hairs of the hind tibia fully half as long as the tibia. In female fore legs simple, fore tibia without submedian setae; mid femur with 3–4 weak *av* and *pv* setae near base and a *p* fringe on apical half, mid tibia with 1–2 *p* setae; hind femur with a row of weak and short *av* setae which terminates in 3–4 strong pre-apical ones, hind tibia with an *ad* and *av* seta.

Length.—4·0–5·8 mm., of wings 3·9–5·3 mm.

Distribution.—EUROPE. NORTH AMERICA. SYRIA. INDIA: Kashmir (Gandarbul, *c.* 6,000 ft. !).

Oriental females are not available, and the data concerning this sex have been derived from European specimens.

143. **Hydrotaea atrisquama** Ringdahl.

(Fig. 83c)

1925. *Hydrotaea atrisquama* Ringd., *Ent. Tidskr*, **XLVI**, 11, 13, 20. Type: Åsljunga, Skåne, S. Sweden. Coll. Ringdahl.

Wholly fuscous-black with thin brownish-grey dust. *Head* thinly dusted brownish-grey; eyes occupying most of it,

contiguous with markedly enlarged upper anterior facets, practically bare; interfrontalia obsolete except in anterior fourth where they are triangular, parafrontalia obsolete except in anterior fourth where they are very narrow, only wide enough to carry the 4–5 small inclinate setae, ocellars fine and moderately long, verticals fine and hardly differentiated from the occipital row; parafacialia linear above, slightly broadened below, jowls about as wide as third antennal segment, the latter falling short of mouth-margin by half its own width; arista long-pubescent, its longest hairs shorter than its basal diameter. *Thorax* without a pattern except for some pale dust at shoulders; about 3+6 fine but distinct *acr*, the rows of which are closer together than to the *dc*, 2 rather strong *ia*, *pra* indistinct; propleural, prostigmal and anterior mesopleural well developed; disc of scutellum practically bare. *Abdomen* rather flattened and short-ovate, uniformly dusted with a conspicuous moderately broad undusted median vitta on the anterior three segments. *Wings* subhyaline, somewhat brownish, with brown veins; r_1 slightly exceeding level of *r-m*, *m-m* straight and very upright, meeting *m* at right angles, posterior apical angle of discal cell sharp. Calyptrae brown with concolorous border and fringe. *Legs* with the usual teeth on the fore femur (Fig. 83*c*), the *av* tooth at apical third broadly rounded, ending in a tooth-like projection directed towards apex of femur, *pv* tooth at apical fourth having the shape of a saw-tooth, base of *v* surface of fore femur with 4 strong straight pointed setae, the proximal ones of which are longer than femoral diameter, fore tibia without a submedian seta, apical half with somewhat longer half-erect *pv* hairs; mid femur with 4–5 straight strong pointed *v* setae on more than basal half, the first or second from the base being the longest, and the penultimate more *pv* in position and close to the distal one, *p* surface with a dense row of half-erect rather long setulose hairs with curved tips, mid tibia with a strong *ad* at apical third and with two *p* setae, mid tarsus with the distal three segments markedly dilated and fringed with somewhat longer curved *av* and *pv* hairs; hind femur with the normal *ad* row, greater basal half of *av* surface with dense erect setulose hairs, which are about as long as femoral diameter (the proximal ones somewhat longer, the distal ones somewhat shorter), hind tibia with an *ad* seta towards apical third and at middle with 4–5 long erect setulose hairs, which are about one-third length of tibia, between them 2–3 much weaker setulae.

Length.—3·8 mm., of wings 3·7 mm.

Distribution.—N.E. BURMA: Kambaiti, 2,000 m., 30.IV.34 (*R. Malaise*), 1 ♂ (Mus. Stockholm). SWEDEN.

Ringdahl's description fits the single male from Kambaiti in every detail, but it does not mention the four spine-like *v* setae at the base of the fore femur. These are present in the type, as Mr. Ringdahl has kindly informed me. It is remarkable that an identical form of *Hydrotaea* should have been found in Sweden and Burma, without being known from the huge territory lying between these two countries, and the possibility can hardly be ruled out that a dead Swedish specimen has been mixed up with the Kambaiti material. On the other hand, a female from S. INDIA: Naraikkadu, Tinnevelly Dist., 2,500–3,000 ft., 11.–13.III.36 (B.M.-C.M. Expedition to S. India, 1936) appears to belong to the same species and, as far as the different sex in the present genus can do so, appears to confirm the occurrence of *atrisquama* in the ORIENTAL REGION.

144. **Hydrotaea dentipes** (Fabricius).

1805. *Musca dentipes* F., *Syst. Antl.*, 303. Type: Denmark, Mus. Copenhagen?

1954. *Hydrotaea dentipes* (F.), Ringdahl, *Svensk Insektfn.*, **XI**, 1.1.59; Nielsen, Ringdahl and Tuxen, 1954, *Zool. of Iceland*, **III**, pt. 48*a*, 116.

Black with rather thin whitish-grey dust, mesonotum with four inconspicuous and incomplete undusted vittae, abdomen moderately thickly dusted whitish-grey with a narrow undusted median vitta, in male hind margins appearing narrowly darker, in female minute black dots present at the base of the hairs and some small shifting black spots. *Head* dusted pale brownish-grey with silver-white parafacialia, parafrontalia almost wholly dark in male, less than posterior half dark in female, interfrontalia velvety fuscous-black or reddish-fuscous; eyes virtually bare, in male separated by $\frac{1}{9}-\frac{1}{15}$ head-width, interfrontalia very narrow behind and forming an elongate triangle in more than anterior half, parafrontalia linear in posterior half, somewhat widened anteriorly, with about a dozen mostly fine inclinate setae, which almost reach level of anterior ocellus, where 1–2 small reclinate setulae are present, ocellars moderately strong, inner verticals very distinct, outer ones distinguishable; frons of female at vertex nearly two-fifths (0·36–0·39) head-width, slightly dilated with almost straight sides to lunula where it is at least two-fifths (0·40–0·43) head-width, frontal triangle reaching middle, apex, edges and posterior part rather densely dusted, rest polished, interfrontalia almost parallel-sided,

but rather strongly narrowed at lunula, almost four times as wide at middle as a parafrontale, the latter with 7–9 somewhat unequal inclinate setae on anterior two-thirds, ocellars and verticals rather strong; parafacialia evenly narrowed downward (in profile), half as wide at middle, jowls fully as wide as third antennal segment, the latter falling short of mouth-margin by about its own width; arista very short-pubescent on basal half of dorsal surface where the longest hairs are about as long as its diameter, otherwise only 'pollinose' *Thorax* in male with dense long erect, in female with very short decumbent, hair; 3+3–4 conspicuous *acr*, the rows less widely separated from each other than from the *dc*, between them rather numerous hairs, both *ia* rather strong and in front of them a weaker third (*post*) *ia* present, *pra* absent in male, rather strong and subequal to the second *npl* in female; anterior mesopleural weak or indistinct in male, well developed in female, lower posterior *stpl* more or less distinct, especially in female. *Abdomen* of male with erect longer hair towards sides and apex, posterior 2–3 segments with a complete marginal row, first or anterior two segments with the marginals distinct only laterally. Lower calyptra whitish-grey subopaque with more or less ochraceous border. *Wings* greyish subhyaline with light brown veins, the membrane in male with a brownish tinge, r_1 slightly exceeding (♂) or reaching level of *r-m*, which lies at or towards three-fifths of discal cell. *Legs* piceous-black, fore femur of male with two teeth, the *pv* one sharp and pointed, the *av* one mussel-shaped, base with 3–4 long strong setae and, beyond a group of numerous short erect black setulae, a row of about 6 erect setulae on basal part of *pv* tooth, fore femur of female normal, fore tibia with 1–2 *ad* setae beyond middle and in male a double emargination in basal half, the convex parts basad and between the emarginations bearing some short erect setulose hairs, the apical part of the *pv* and *v* surface some longer ones; mid femur with some rather strong *a* setae on basal half, a *p* fringe of rather long setulose hairs and in male numerous very long setulose hairs on *av*, *v* and *pv* surfaces of less than basal half, mid tibia with 2–3 *p* setae and in male dense fine erect short hairs on *a* and *av* surfaces, in female an *ad* seta; hind femur with 3–4 (♀) or 6–8 (♂) strong *av* setae on apical two-fifths, otherwise in female only with short *av* setulae, in male with a fringe of long setulose *av* and *pv* hairs, hind tibia in addition to the very strong *pd* with 3–4 *av* setae and 1 *ad*, the latter in male indistinct or inconspicuous in a double or triple fringe of fine rather long *ad* hairs.

Length.—5·5–8·0 mm., of wings 4·8–6·2 mm.

Distribution.—EUROPE. ICELAND. GREENLAND. NORTH AMERICA (Alaska to Mexico). AZORES. INDIA: Kashmir (Gulmarg). N. India (Naini Tal Dist. ; Simla).

145. **Hydrotaea occulta** (Meigen).

1826. *Anthomyia occulta* Meig., *Syst. Beschr. eur. zweifl. Ins.*, V, 133. Types: C. Europe. Mus. Paris?

1954. *Hydrotaea occulta* (Meig.) Ringdahl, *Svensk Insektfn.*, XI, 1.1.61; Nielsen, Ringdahl and Tuxen, 1954, *Zool. Iceland*, III, pt. 48*a*, 117.

Fuscous-black with rather thin uneven greyish-brown or grey dust, which is denser round the shoulders, the posterior *prst dc*, to a lesser degree along the *post dc*, and on abdomen. *Head* densely dusted pale grey on face and underside, the dust narrowly ascending on outer part of parafrontalia; eyes of male densely long-haired, subcontiguous, interfrontalia obsolescent at middle, very narrowly triangular above, narrowly triangular below, parafrontalia linear above, moderately dilated in anterior half, with 10–15 long inclinate setae, which extend almost to level of anterior ocellus, ocellars long and fine, verticals indistinct, parafacialia slightly over half as wide, jowls half as wide again, as third antennal segment, the latter falling short of mouth-margin by almost its own width; arista thin, extremely short-haired, longest hairs shorter than its basal diameter. *Thorax* in a strongly posterior view appearing unevenly velvety brown or grey, in an oblique posterior view with narrow velvety brown or grey vittae along the *dc*, the dark median vitta narrower in front of suture, scutellum appearing dark with some grey dust round the subbasal setae and along apical part of ventral margin; 2–3+4–5 distinct though not very strong *acr*, 2 strong *ia*; propleural well developed, prostigmal similar but rather indistinct among a number of adjacent long bristles, anterior mesopleural fine and rather long but not conspicuous; disc of scutellum evenly haired. *Abdomen* ovate, in posterior view densely dusted greyish-brown or grey with a moderately narrow undusted median vitta, which becomes very narrow or indistinct on fourth segment, and with narrow dark brown hind, or hind and fore, margins, declivous part of first segment appearing dark. *Wings* subhyaline with a slight brownish tinge, veins brown with somewhat paler bases; r_1 fully reaching level of *r-m*, *m-m* slightly concave or straight, rather upright. Calyptrae subhyaline, upper one with whitish border and fringe, lower

one pale ochraceous with concolorous border and pale golden fringe. *Legs* piceous, fore femur with rather dense and long hair and setae, the *pv* tooth sharp, directed apicad, its *p* surface with about 4 short erect black setae, the *av* tooth larger, its point less sharp and reaching less far apicad, its *p* surface broadly excavated, shell- or ear-shaped, fore tibia broadly emarginate in basal half, the individual two excisions and the tubercle between them weakly developed, apical two-fifths or half of anterior tibiae with longer half-erect *v* and *pv* hairs, which are less conspicuous but quite distinct on fore tibia; mid femur with a few longer *av* setae on basal third and a complete fringe of long *p* (almost *pv*) bristles, mid tibia with 2–3 *p* setae; hind femur close to base of *v* surface with a stout, erect, compressed spine (actually two closely adjacent ones), the apical part of which is somewhat bent towards base of femur, whilst the extreme tip is crotchet-like, sharply bent towards tip of femur, the femur very slightly swollen at apical third, with 4–5 strong *av* pre-apicals, hind tibia describing a slightly sigmoid curve, with a complete fringe of long *ad* setulae, the *av* and *v* surface with numerous setulae which are less dense but stronger than the hairs on apical part of the other tibiae, *pd* seta about a quarter length of tibia, situated at apical fourth.

Length.—4·3–6 mm., of wings 3·7–4·9 mm.

Distribution.—ALL EUROPE (up to Scotland and Finland). ICELAND. AZORES. CANARY IS. N. AFRICA. N. AMERICA. N.E. BURMA: Kambaiti, 2,000 m. FORMOSA.

Only one Oriental specimen, a male, is available, and the description has been drawn up from this and a number of British specimens. In doing so I found that the Kambaiti male differs in no way whatever. European females of *occulta* will be traced to this species in the key, and this may be expected to apply to any Burmese ones. The eyes of the female are much less hairy, the frontal triangle and upper part of the parafacialia glossy, and the mesonotum is uniformly dusted grey.

146. **Hydrotaea cyrtoneurina** (Zetterstedt).

1845. *Aricia cyrtoneurina* Zett., *Dipt. Skand.*, **IV**, 1486. Type: Copenhagen. Mus. Lund.

1954. *Hydrotaea cyrtoneurina* (Zett.), Ringdahl, *Svensk Insektfn.*, **XI**, 1.1.60.

Piceous-black with moderately thick brownish-grey, on thorax of male thin brown, dust, mesonotum with 4 dark

undusted vittae, which are faint or indistinct in male, and the paramedian ones of which tend to fuse into a broad median vitta; abdomen with a moderately narrow somewhat suffused median vitta, some slight shifting dark spots and in male darker dust on hind margins. *Head* moderately densely dusted pale brownish-grey with silver-grey parafacialia, parafrontalia blackish, in female with some brownish dust; eyes rather densely hairy, the hairs in female short, in male moderately long; frons of male about a tenth ($\frac{1}{8}-\frac{1}{12}$) head-width at narrowest part, very slightly dilated to vertex, more strongly to lunula, interfrontalia thinly dusted brown, narrow behind, dilated to form an elongate triangle in anterior half or more, parafrontalia almost linear in upper half, slightly dilated anteriorly, with 10–15 rather long inclinate setae, which do not reach level of anterior ocellus, 1–2 small reclinate setulae near the latter, ocellars rather fine or fine, verticals fine, not very distinct; frons of female 0·37 times head-width at vertex, very slightly dilated with almost straight sides to lunula where it is two-fifths head-width, frontal triangle reaching middle, thinly dusted, slightly shining, more so near ocelli, interfrontalia with some brown dust, rather strongly narrowed at lunula, almost four times as wide at middle as a parafrontale, the latter with about 7 moderately strong, and between and behind them a few hair-like, inclinate setae, ocellars and verticals strong; parafacialia evenly narrowed downward in profile, about half as wide at middle as third antennal segment, jowls of male slightly, of female considerably, narrower than that segment; ventral part of jowls in male densely setulose, the setulose band broadly reaching vibrissae. Third antennal segment falling short of mouth-margin by its own width; arista densely short-pubescent on basal third, otherwise almost bare, longest hairs about as long as its basal diameter. *Thorax* in male with long, dense, erect, in female with rather short, sparse, half-erect hair; *acr* and *pra* as in *dentipes*, both *ia* strong; mesopleural and lower posterior *stpl* indistinct, except sometimes in female. *Abdomen* haired as in *dentipes*. *Wings* greyish subhyaline with brown veins, membrane in male with a slight brownish tinge, especially anteriorly; r_1 slightly exceeding or reaching level of *r-m*, which lies towards three-fifths or two-thirds of length of discal cell. Lower calyptra of male brownish subhyaline, of female greyish-white subopaque, with ochraceous border. *Legs* piceous, in male fore femur with the normal two teeth, the *pv* one being sharply pointed, the *av* one more

mussel-shaped, basad of the latter a group of strongish half-erect setulae, on the *av* tooth the usual row of about 6 closely-set short setae, fore tibia with a single long basal emargination, rather suddenly becoming broader beyond basal third, the *pv* surface forming a sharp edge to beyond middle, apical third with slightly longer half-erect *v* hairs; mid femur with an *a* fringe, a row of rather weak *av* setae and about 5 strong, somewhat blunted setae on basal half and with a *p* fringe of long setulose hairs, mid tibia with 3–5 (in the Indian specimens almost always 4–5, in European ones normally 3) *p* setae; hind femur with 5–6 rather strong *av* and *pv* setae on apical third, *av* surface otherwise with a row of setulae, hind tibia with a row of *c.* 6–8 rather strong but not very long *av* and *pv* setae, a strong *pd* which forms part of a rather dense and short fringe of setulae, and a less dense fringe of stronger irregular *ad* setulae. Fore legs of female normal, the tibia with a postmedian *ad* seta (which in male is present but small); mid femur with similar but weaker setae than in male, mid tibia with (2–)3 *p* setae; hind femur with setae as in male, but basal half without outstanding *av* setulae, hind tibia without distinct *pv* setae, with fewer *av* setae and less developed *ad* and *pd* fringes, the *pd* setae being, however, strong, and 1–3 *ad* setae conspicuous.

Length.—5·8–8·4 mm., of wings 5·3–6·8 mm.

Distribution.—EUROPE (in the North to S. England and S. Sweden). CHILE (Séguy). S. INDIA (Kodaikanal !).

Four Oriental males but no Oriental females are at hand, so the characters of the latter sex are based on British specimens. The female of *lasiopa* is very similar but differs, apart from the characters mentioned in the key, by the absence of the *pra*, much longer hairs of the eye and wider jowls.

147. **Hydrotaea lasiopa** sp. n.

♀: Fuscous-black with rather dense silver-white dust anteriorly, which defines the 4 (6) black vittae on thorax, dust thinner and more grey behind suture and on abdomen. *Head* with pale golden-grey dust on face and lower part, frons appearing fuscous-black in anterior view, but in a more dorsal view the pale dust ascending to upper part of parafrontalia; eyes densely long-haired, separated at vertex by three-tenths head-width, at lunula by fully a third head-width, frontal triangle not reaching middle, moderately shining, largely appearing shagreened, interfrontalia parallel-sided, two-and-a-half times as wide at middle as a parafrontale,

the latter with 6–8 rather strong inclinate setae, which practically reach level of proclinate setae, and between which a few shorter setae may be interspersed, ocellars and inner verticals strong, outer verticals moderately strong; parafacialia half as wide, jowls half as wide again, as third antennal segment, the latter falling short of mouth-margin by about half its own width; arista thin, very short-haired, longest hairs hardly as long as its basal diameter. *Thorax* with four dark vittae in front, the paramedian ones coalescing from suture onwards, the outer ones interrupted at suture, divided behind suture by a vitta of pale dust along the *ia*, and the inner arm more or less fusing with the paramedian vittae at level of third *post dc*; 1+1 *acr*, the anterior pair close to suture, 2 strong *ia*, *pra* absent; propleural and prostigmal well developed, the latter, however, not very conspicuous as one of a group of rather similar strongish bristles, anterior mesopleural indistinct. *Abdomen* appearing undusted in dorsal view, in posterior view the first segment with an undusted triangular median spot, the tip of which approaches or reaches hind margin, second segment with an undusted median vitta and rather broad hind margin, third segment appearing largely undusted with some dust towards anterior angles, fourth broadly dark along median line and thinly dusted towards sides. *Wings* subhyaline with a very slight brownish tinge and brown veins, r_1 markedly exceeding level of *r-m*, r_{4+5} rather sinuous and curved back towards apex, *m* conspicuously upcurved in apical part, *m-m* strongly sinuous and rather oblique. Calyptrae greyish subhyaline with greyish-white border and fringe. *Legs* piceous-black; fore tibia without a submedian *p* seta; mid femur with a fringe of rather short and fine *av* hairs, especially distinct on apical half, and with a fringe of somewhat longer setulose *pv* hairs, mid tibia with 2 *p* setae; hind femur with a complete row of not very dense *av* setae, which are short and fine on basal half and become suddenly strong and long (up to nearly twice length of femoral diameter) on apical half, and a fringe of fine setulose *pv* hairs on apical fourth, hind tibia with a fringe of short half-erect *ad* setulae among which two are moderately strong, and with 3–4 not very strong *av* setae.

Length.—7·1–8·2 mm., of wings 7·2–7·6 mm.

Distribution.—N.E. BURMA: Kambaiti, 2,000 m., 4.VI.34 (***R. Malaise***), ♀ type (in Mus. Stockholm, 1 ♀ paratype in B.M.), 25.IV.34, 1 ♀ paratype (in Mus. Helsinki).

Genus 29. **Azelia** Robineau-Desvoidy.

1830. *Azelia* R.-D., *Myod.*, 592. Genotype: (*Azelia florea* R.-D. = *duodecimpunctata* R.-D. =) *Anthomyia triquetra* Wied.

Head with the eyes contiguous or subcontiguous in male, broadly separated in female, where cruciate interfrontal and proclinate orbital setae are present, frontal triangle only slightly longer than ocellar tubercle; palpi not markedly broadened; arista pubescent. *Thorax* with at least the *prsc acr* distinct, 2+3 *dc*, 2 *ia*, *pra* absent or very small, 1+1 or 1+2 *stpl*, the other setae as usual. *Abdomen* slender with rather strong marginals and a tendency towards the development of discal setae; ventrobasal scale bare. *Wings* (Fig. 85) with *sc* not sinuate beyond its point farthest from *c*, rather straight, the apical part straight and oblique, much as in *Hydrotaea*; *m* straight or very slightly upcurved in apical section; sixth vein rather short and ending abruptly towards or at middle between anal cell and wing margin; seventh vein rather strongly concave outwardly, so that by further extension these two veins would meet before reaching wing margin; all veins (except *c*) bare. *Legs* rather slender; fore femur without teeth or spines; hind coxa on apical margin of posterior surface with one or more conspicuous setae, hind tibia in male often with rows of erect or half-erect hairs.

Distribution.—EUROPE. ASIA MINOR. NORTH AMERICA. One species among Malaise's Burma material.

Biology.—Adults throughout summer on flowers and excrements, sometimes forming swarms in the air. The eggs (described by Hammer, 1941, *Vidensk. Medd. Dansk nathist. For.*, CV, 120, fig. 32) are deposited in batches in crevices in dung of cattle and horse, and the larvae live in the dung.

Azelia has been placed as a separate group in MYDAEINI (his *MYDAEINAE*) by Karl (1928, *Tierw. Deutschl.*, 13, Dipt., III, 70) and Hennig (1956, in *Lindner, Flieg. Palaearkt.*, 63*b*, 102) and in *FANNIINAE* by Séguy (1937, *Gen. Ins. fasc.*, 205, 178). The seventh wing vein approaches the latter group, but the absence from the hind tibia of a *d* seta in addition to the pre-apical does not allow its being included in that subfamily. However, *Hydrotaea, Ophyra* and related genera in PHAONIINI show very similar transitional tendencies towards *Fannia*, and *Lasiops* shows the same setulae on the posterior surface of the hind coxa. It appears, therefore, most logical to place all these transitional genera towards *FANNIINAE* together in PHAONIINI, a view in which I find myself in agreement with Fonseca (1956, *Trans. Soc. Brit.*

Ent., **XII**, 118). The presence of only 5 pairs of abdominal spiracles in the female, whereas there are 7 in *FANNIINAE*, confirms this position.

148. **Azelia nuditibia** sp. n.

(Fig. 85)

♂ ♀: Fuscous-black with rather dense brown dust, interfrontalia velvety blackish-brown. *Head* in male with almost contiguous bare eyes, interfrontalia obsolete at middle, triangular in front, parafrontalia linear, except in front, where they are almost half as wide as the interfrontalia, and where they carry a pair of inclinate setae; in female the frons two-fifths head-width, parafrontalia well defined, brown-dusted, hardly one-fifth width of interfrontalia, in addition to the anterior inclinate seta only with a proclinate seta (at level of cruciate interfrontals) and two reclinate setae (between the proclinate and level of anterior ocellus); ocellars in male small, in female strong, verticals in male indistinct, in female moderately strong. Third antennal segment hardly twice as long as second, not reaching level of vibrissa, the latter at (♀) or above (♂) level of lower eye margins; arista finely short-haired, the hairs of almost even length, not longer than its basal diameter. *Thorax* with denser and slightly more greyish dust at sides, along lateral part of suture and on posterior half of *post* part, in female the greyish-brown dust extends forward somewhat unevenly, so that traces of 7 narrow darker vittae may be visible; *acr* in front of suture in two rows, which are slightly less widely separated from each other than from the *dc*, the last pair close to suture stronger, behind suture in 2–4 irrégular rows, weak, except for the *prsc*, which lie considerably behind level of last *dc*; *pra* hair-like; scutellum with the normal two pairs of strong marginals, a pair of weak pre-apicals and a marginal setula at base, otherwise bare, apex in male narrowly pale dusted; anterior mesopleural distinct, 1+1 distinct *stpl*. *Abdomen* oblong, in male only slightly narrowed from apex of first to base of fourth segment, in female oblong-ovate with pointed apex; moderately densely dusted brownish-grey, the intermediate segments with a not very narrow median vitta, which ends well before hind margins, and which in female is pointed behind, and with a pair of roundish spots, which do not approach nearer hind margins than the vitta and which are even more widely separated from fore margins, and tend to coalesce with median vitta; fourth segment with a similar but less conspicuous pattern; dorsal surface in male with 3

pairs of long marginals and discals on second to fourth segments. *Wings* (Fig. 85) slightly brownish, subhyaline; r_{4+5} very slightly curved backward, apices of r_{4+5} and *m* straight and slightly converging. Calyptrae brown with brown

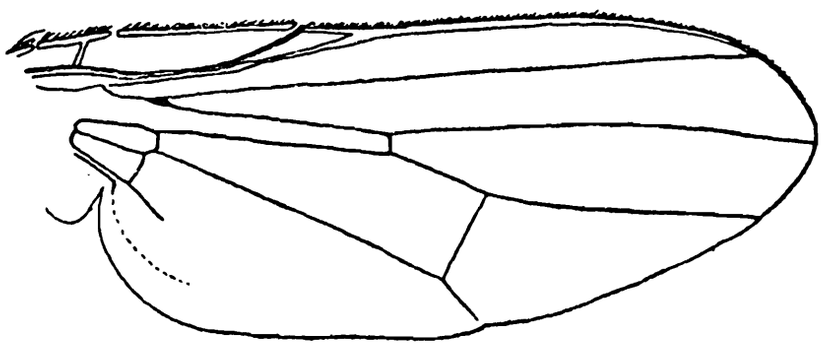


FIG. 85. *Azelia nuditibia* sp. n., wing.

border and fringe, in female somewhat paler with golden fringe. Halteres brownish-yellow. *Legs* fuscous-brown, distal segments of male fore tarsus laterally compressed and somewhat produced on dorsal surface; mid femur of ♂ with a long straight pointed *pv* seta towards middle, 2–3 strong *pv* pre-apicals, without an *a* pre-apical, in ♀ with an *a* pre-apical, mid tibia in ♂ without submedian setae, in ♀ with a *p* seta towards middle; hind femur with 2 strong *ad* and *av* pre-apicals, in ♂ the proximal *ad* at three-quarters, especially long, in ♀ the *av* sometimes increased to 3–4, hind tibia with 2 (in ♀, 1–3) *av*, otherwise without erect or half-erect setulae, only the decumbent *ad* setulae somewhat longer in male.

Length.—2·3–3·2 mm., of wings 2·9–3·5 mm.

Distribution.—N.E. BURMA: Kambaiti, 2,000 m., 26.IV.34 (*R. Malaise*), ♂ type, 1 ♂ paratype, 18.IV. and 30.IV 14.V.34, 9 ♀ paratypes (type in Mus. Stockholm, paratypes in Stockholm, Helsinki and B.M.).

In keys to the European species *nuditibia* will be traced to *triquetra* Wied. ('*nudipes*' Zett.), but in this species the hind tibiae are furnished with a *pv* and *ad* row of fine half-erect hairs, which are not present in the Burma species.

Tribe DICHAETOMYIINI

The group is closely related to the MYDAEINI, and the tribe DICHAETOMYIINI has been created (Emden, 1951, B.M. Ruwenzori Exped. 1934–35, II, 377) more for the practical needs to classification than for phylogenetic reasons, as the

species have as a rule a distinct small *pd* seta ('*Phaonia* calcar') on the apical half of the hind tibia. The inclusion of the DICHAETOMYIINI in the MYDAEINI thus would render the separation of the PHAONIINI from the other tribes impossible, since the same seta is so inconsistent in the various species of *Hydrotaea* and *Ophyra*.

The black setulae along the lower margin of the metathoracic spiracle (Fig. 45) in connection with the setulose pteropleura or embossed upper part of hypopleura separate the forms of this tribe from the remaining tribes of the *PHAONIINAE*.

Key to the Genera of Dichaetomyiini.

1	(2) Pteropleura and prosternum setulose. Base of r_{4+5} setulose at least on underside..	*Dichaetomyia* Mall., p. 333
2	(1) Pteropleura and prosternum bare, as is the base of r_{4+5}. Embossed upper anterior part of hypopleura conspicuously setulose, but main part of hypopleura in front of spiracle bare.....	*Tamilomyia* gen. n., p. 425

Genus 30. **Dichaetomyia** Malloch.

1921. *Dichaetomyia* Mall., *Ann. Mag. n. H.* (9), **VII**, 163; l.c. (9), **VIII**, 419; 1925, *Austral. Zool.*, **III**, 322; 1925, *Phil. Journ. Sci.*, **XXVI**, 323; 1928, *Ent. Mitt.*, **XVII**, 317; 1929, *Ins. Samoa*, **VI**, 3, 170; Séguy, 1937, *Gen. Ins.*, 205, 343; Emden, 1942, *Ann. Mag. n. H.* (11), **IX**, 677; Hennig, 1952, *Beitr. Ent.*, **II**, 82. Genotype: *D. polita* Mall., 1921.

1927. *Lophomala* End., *Konowia*, **VI**, 54. Genotype: *Mydaea flavipalpis* Stein.

Head with bare eyes, which are normally contiguous to narrowly separated in male, but in a few species as widely separated in male as in female; frons without cruciate interfrontal and proclinate orbital setae, anterior of the two reclinate setae of the female weaker; frontal triangle not very conspicuous or large; arista long-plumose. *Thorax* with or without a pair of *prsc acr*, otherwise without *acr* setae; 1–2+2–4 *dc*; 1–2 *ia*; *pra* as a rule short but very distinct; anterior mesopleural present, 1+2 *stpl*, the other setae normal; prosternum and upper part of pteropleura always setulose, propleural depression bare; lower margin of metathoracic spiracle with a complete row of black setulose hairs. *Abdomen* short-ovate to subglobose, without any strong setae;

ventrobasal scale setulose at least laterally. *Wings* (Pl. 2, fig. 12) with *sc* markedly sinuate beyond *h*, apical part strongly upcurved; base of r_{4+5} with some setulose hairs on (at least) underside; underside of stem-vein with some erect fine hairs which are often pale and difficult to trace; *m* more or less distinctly upcurved at extreme tip. *Legs* moderately slender; mid femur with an *a* pre-apical, mid tibia without *ad*, *av* or *pv* setae; hind tibia almost always with a small *pd* seta at about third fifth, *ad* pre-apical well developed.

Distribution.—ETHIOPIAN, ORIENTAL and AUSTRALIAN REGIONS (from SIERRA LEONE to SAMOA). According to Hennig (1957, in Lindner, *Flieg. palaearkt. Reg.*, pt. 63*b*, MUSCIDAE, part 197, p. 149, footnote 2) the C. EUROPEAN *Helina doubleti* (Pand.) almost certainly belongs to this genus.

Biology.—Adults are found on dung, diseased fruit; sometimes entering houses. Females in collections often show an egg—with conspicuous flanges—protruding from the ovipositor, but in one case (Malloch, 1929, 173) a larva has been found in the same position. The species therefore appear to be oviparous (ovoviviparous?) or viviparous. Larvae in dung, that of *D. pallitarsis* has been recorded 'ex Pyralid [Cuthbertson, 1934, *Proc. Rhodesia Sci.* (*Diatraea*)] larva boring padi stems' (Malloch, 1929, *Ann. Mag. n. H.* (10), **IV**, 109; *Ass.*, **XXXIII**, 34). This may indicate that the older larvae are predacious like many other larvae of Phaoniinae.

Malloch has recorded '*D. niveipalpis* (Stein)' from Malaya, Siam, Sumatra, the Philippine Islands and Formosa, but the only specimen named by him and available to me has only 3 *post dc* and is identical with his *pendleburyi*, whilst Stein consistently attributes 4 *post dc*, gradually decreasing in length anteriorly, to his *niveipalpis*, which he records only from Java. The frons (of the female) also is wider in Malloch's species. Dr. G. Kruseman has very kindly lent me the type of Stein's *Spilogaster niveipalpis*. It has no black setulae on the metathoracic spiracle, a bare prosternum, and the setulae of the pteropleura extending only just on to the embossed upper part. There is a very weak *pd* seta at apical fifth of hind tibia and a low but very sharply defined keel between the base of the antennae. Stein's species, therefore, does not belong to the present genus and tribe but is probably closely related to *Rhynchomydaea*. The male is unknown.

D. armata (Stein) has also been recorded repeatedly from the Oriental region by Malloch, but always on the basis of females, which do not show the distinctive character on which Stein based the name. I am satisfied that these females belonged to *malayana* Mall.

Key to the Species of Dichaetomyia.

1 (32) Scutellum setulose along lower edge (Fig. 86*a*), the setulae being black and decumbent like those on disc and upper part of sides, or the ventral surface with fine erect pale cilia (Fig. 86*b*). Node at base of r_{4+5} bare on dorsal surface. ♂: Fore femur without a comb of short and stout *av* setulae near apex (as far as ♂ is known).

2 (7) Lower *stpl* equidistant from anterior and posterior ones. Fore tibia with a *p* seta, except in ♂ of *malayana* (♂ ♀ of *simulans* unknown).

3 (4) Hind tibia with only 1 *ad* seta. Only 2+2 strong *dc*, the anterior *post dc* slightly anterior to level of *sa*. Anterior *ia* absent. Fuscous-brown with wholly pale legs, pale shoulders and somewhat testaceous translucent scutellum and abdominal incisures..... *simulans* (Stein), p. 347

4 (3) Hind tibia with 2 (–3) *ad* setae. 4 *post dc*, though the anterior two may be very weak, in this case the first strong one slightly posterior to level of *sa*. Anterior *ia* distinct. Hypopleura with some setulose hairs both in front of lower part of spiracle and just above coxa.

5 (6) Only the posterior 2 *post dc* strong, the anterior two very weak, and only 1 strong *prst dc*, the other one small. Infrasquamal hairs conspicuous; hypopleura bare. Fuscous-brown with pale ferruginous shoulders and tibiae, underside dark rufous-brown. Fore tibia with some *ad* setulae on apical half but without an *ad* seta. ♂: Frons a quarter head-width.... *pallitarsis* (Stein), p. 348

6 (5) 2+4 conspicuous *dc*. Infrasquamal hairs absent; hypopleura with numerous hairs. Pale ferruginous, mesonotum browned with three pale dusted vittae (type) or with a narrow blackish, white-dusted vitta along the *dc* and a white-dusted median vitta which becomes faint behind suture (ssp. n. *tamil*) and the apex of the abdomen strongly (type) or slightly (ssp. n. *tamil*) infuscated. *prsc* small and fully

twice as distant from the *dc* as from each other, behind level of last *dc* and not stronger than the seta behind and between the last *dc* and *ia*. Scutellum as long as the distance between the lateral scutellars (Fig. 87*a*). Pleurae wholly pale, except for the fuscous triangle below the infra-alar bulla. ♂: Fore tibia without a *p* seta; frons about twice as wide as third antennal segment, parafrontalia bristled on entire length; fourth ventrite with a deep U-shaped excision and a glabrous, slender, slightly curved process which extends backward (Fig. 88). ♀: Fore tibia basad of middle with a conspicuous *ad* seta..... *malayana* Mall., p. 349

7 (2) Lower *stpl* markedly closer to posterior than to anterior *stpl*.

8 (11) Fore tibia with a *p* seta. 1+2 strong and 1+2 small *dc*, the anterior strong *post dc* slightly posterior to level of *sa*. Anterior *ia* distinct. Hypopleura bare in front of spiracle but with some setulae above coxa. Hind tibia with only 1 *ad* seta *.

9 (10) Posterior surface of stem-vein with a few black setulose hairs. Shoulders, halteres and lateral surface of scutellum testaceous; paramedian vittae of mesonotum just in front of suture almost twice as widely separated as the vittae of each side. . . .. *senior whitei* sp. n., p. 352

10 (9) Posterior surface of stem-vein without setulose hairs. Shoulders, halteres and scutellum fuscous; paramedian vittae of mesonotum just in front of suture only a third more widely separated as the vittae of each side.... *keiseri* sp. n., p. 354

11 (8) Fore tibia without a *p* seta.

12 (29) Underside of scutellum without fine erect pale golden hairs (Fig. 86*a*).

13 (24) At least 3 strong *post dc*. Infrasquamal hairs absent. Hypopleura with some setulae both in front of lower end of spiracle and just above coxa. Pleurae and at least front femora pale testaceous or

---

* Structural characters as in *senior whitei* but the anterior two *post dc* absent.—Thorax wholly pale ferruginous. (Fore tibiae of only specimen lost). Cf. *dichaeta* (par. 25).

ferruginous. Mesonotum with a pair of vittae of rather dense whitish dust and with at least the beginning of a similar broad median vitta behind neck, disc strongly infuscated except in *peroë*. Scutellum conspicuously $\frac{1}{4}$ to $\frac{1}{5}$ shorter than the distance between the lateral scutellars (Fig. 87*b*). If 4 *post dc* are present, the *prsc* level with the last *dc*.

14 (15) Posterior femora piceous, posterior tibiae somewhat browned. Palpi ochraceous. Mid tibia with 4–5 *p* setae. 2+3 strong *dc*. (♂ unknown). . . *phaeocnemis* sp. n., p. 355

15 (14) Posterior femora pale ferruginous or testaceous, tibiae not browned. Palpi dull brownish-testaceous to fuscous-brown. Mid tibia normally with only 2 *p* setae. ♂: Frons not much more than half as wide as third antennal segment; parafrontalia bare on upper half except for 2 reclinate setulae near ocelli.

16 (21) Three strong *post dc*.

17 (20) Disc of fourth abdominal segment very thinly dusted like that of third, thus appearing finely shagreened; apical margin always pale. Median part of mesonotum broadly infuscated under the white dust.. *nubiana* (Big.), p. 357

18 (19) Abdomen wholly testaceous to pale ferruginous, though the posterior segments may be irregularly browned by post-mortem rot.... *nubiana nubiana* (Big.).

19 (18) Third and fourth abdominal segments piceous, the fourth with orange-yellow apical margin..... *nubiana aureomarginata* ssp. n., p. 358

20 (17) Disc of fourth abdominal segment entirely undusted and glossy; apical half entirely piceous. Mesonotum nowhere infuscated.. *peroë* (Walk.), p. 359

21 (16) Four strong *post dc*.. . *quadrata* (Wied.), p. 360

22 (23) Disc of fourth tergite thinly dusted like the third, thus appearing finely shagreened; third and fourth tergites not much darker than anterior ones, though sometimes browned by post-mortem rot.. *quadrata quadrata* (Wied.).

23 (22) Fourth tergite entirely undusted, except at extreme base of lateral

surface, therefore perfectly glossy, third and fourth segments piceous-black, including apex of fourth.. . ... *quadrata monticola* ssp. n., p. 361

24 (13) Not more than 2 strong (and in addition 0–2 very weak) *post dc.* Infrasquamal hairs present. If the hypopleura has setulae in front of lower part of spiracle, the body and front femora largely piceous-brown.

25 (26) Thorax and legs wholly pale ferruginous (even the triangular sclerite below infra-alar bulla pale). 2+2 *dc*, the anterior *post* one strong, at level of *sa*, there being hardly any trace of smaller *post dc* in front. Halteres dull reddish-yellow..... *dichaeta* sp. n., p. 361

26 (25) Body largely piceous-brown to fuscous. In addition to the 2 strong *post dc* 1–2 weak *post dc* present.

27 (28) Legs wholly pale ferruginous. 2 strong *prst dc*, 1 weak *post dc* present, the first strong *post dc* anterior to level of *sa*. Hypopleura with setulae just above coxa only, bare in front of lower part of spiracle. Halteres dull reddish-yellow.... *curvivena* sp. n., p. 362

28 (27) Coxae and femora piceous-brown. 1 strong *prst dc* (and a very small one in front), 2 weak *post dc*, the first strong *post* one behind level of *sa*. Hypopleura with some setulae both above coxa and in front of lower part of spiracle. Halteres strongly infuscated. ♂: Frons almost to fully twice as wide as third antennal segment, parafrontalia setulose on their entire length. ... . *dorsocentralis* sp. n., p. 364

29 (12) Underside of scutellum with fine erect pale golden hairs (Fig. 86*b*), lower part of lateral surface with or without a few darker decumbent hairs. Lower *stpl* closer to posterior than to anterior one. 2+3 strong *dc*.

30 (31) Palpi fuscous.* Infra-alar bulla

---

* *D. nitidiventris* (Stein) from Sumatra, the type of which Dr. G. Kruseman has been good enough to let me study, is very closely related to *bibax*, but the ground-colour of the whole thorax is pale ferruginous with only a broad infuscated median vitta on mesothorax overlaid with dense pale greyish-yellow dust.

fuscous or strongly infuscated; *m* conspicuously upcurved at apex (Fig. 89*a*). Scutellum conspicuously dusted and usually strongly infuscated on base and disc. Pleurae largely fuscous. Third antennal segment strongly infuscated. Abdomen wholly fuscous-black with a somewhat olivaceous lustre. . . . . *bibax* (Wied.), p. 365

31 (30) Palpi yellow. Infra-alar bulla pale ferruginous; *m* very slightly upcurved at apex (Fig. 89*b*). Scutellum almost undusted, wholly pale ferruginous. Pleurae wholly or largely pale ferruginous. Abdomen with pale base and tip.... *flavipalpis* (Stein), p. 367

32 (1) Scutellum bare along lower edge (Fig. 86*c*).

33 (77) Fore femur without a row of short strong *av* setae on apical part, and stem-vein bare on posterior side of dorsal surface. (♀ ♀ are not always easily distinguishable from those in the opposite group, and the negative characters mentioned in para. 77 should always be checked.)

34 (43) Fore tibia with 1–2 submedian *p* setae.* 3 strong *post dc*. Ventrobasal scale setulose only on lateral margins.

35 (40) Base of abdomen largely, and femora and coxae wholly, pale testaceous. Hypopleura wholly bare. Scutellum and at least lateral parts of mesonotum and parts of the pleurae pale.

36 (37) Infrasquamal hairs absent. Disc of mesonotum and large parts of the pleurae infuscated. First tergite with a narrow but conspicuous piceous hind margin. Calyptrae with pale testaceous borders. Arista long plumose. *indica* (Walk.), p. 369

37 (36) Infrasquamal hairs present. Thorax wholly pale ferruginous. Lower calyptra with brown border. Arista short-plumose.

38 (39) Fourth abdominal segment yellowish-orange except for basal part, which is piceous like the intermediate segments and a conspicuous

* Seven species from the Philippines, keyed by Malloch, 1925, and perhaps *D. surgens* (Stein) from Java have 1–2 *p* setae on the fore tibia and will be traced to this paragraph; some of them may still be discovered in the area to which this volume is devoted.

hind margin on first segment. 2 *post acr*, outer row of *prst acr* hairs markedly longer and stronger than the other rows. Fore femur usually with one or a few strong *av* setulae near apex.... . *acrostichalis* sp. n., p. 371

39 (38) Fourth abdominal segment, except lateral angles, and posterior and median part of third strongly browned, first segment with only a linear hind margin inconspicuously browned. Only one *post acr*, outer row of *prst acr* hairs not markedly longer than other rows. *aurantiaca* sp. n., p. 372

40 (35) Abdomen wholly fuscous- or piceous-brown, femora piceous-brown, coxae infuscated. Hypopleura with some setulose hairs just above hind coxa.

41 (42) Infrasquamal hairs present but small and scarce. Posterior tarsi strongly browned. Scutellum wholly translucent ferruginous-brown. Pleurae ferruginous with dark suffusions. .... *brunneofemorata* sp. n., p. 373

42 (41) Infrasquamal hairs absent. Only apical segment of posterior tarsi darkened. Base and disc of scutellum piceous-brown, margins pale ferruginous. Pleurae fuscous. . ... *fusciventris* sp. n., p. 374

43 (34) Fore tibia without submedian *p* setae.

44 (48) 4 *post dc*, the first of them sometimes weak or absent, but then the first of 3 strong ones farther from suture than from the second strong *post dc* (Fig. 91).

45 (46, 47) Dorsal surface appearing undusted, glossy, wholly ferruginous (ssp. *pallidorsis*) or with the disc of the mesonotum piceous (ssp. *bioculata*), fourth tergite with a roundish or ovate piceous spot on lateral surface (Fig. 90). 2+4 strong *dc*, the anterior two *post* ones subequal and strong (though shorter than the third). Femora wholly pale testaceous.. ... . *prolixa bioculata* ssp. n., p. 375
,, *pallidorsis* ssp. n., p. 377

46 (45, 47) Dorsal surface densely dusted brownish-grey, in typical form

largely fuscous, and posterior abdominal segments or all the abdomen wholly fuscous in ground-colour. The first *post dc* weak, the second somewhat stronger. Femora more or less broadly browned at base (typical form) or wholly pale ferruginous. *pallens* (Stein), p. 378

47 (45, 46) Dorsal surface (Fig. 91) largely shining ferruginous, mesonotum anteriorly with three pale brownish-dusted vittae; fourth tergite wholly pale ferruginous, second and third with a suffused subtriangular median infuscation. First *post dc* entirely missing, the other 3 strong. ..... *manca* sp. n., p. 379

48 (44) 3 strong *post dc*, the first closer to suture than to the second (Fig. 94).

49 (52) Node at base of r_{4+5} with some black setulae on dorsal surface (in addition to those on ventral surface). Coxae, trochanters and femora wholly pale testaceous.

50 (51) Palpi fuscous. Hind tibia dark brown. Apical half of fourth tergite pale testaceous; second tergite wholly piceous, first with piceous hind margin. *m-m* moderately oblique, last sector of *m* therefore almost twice as long as last but one. Mid femur with 1 *a* pre-apical. Wing length *c.* 7 mm. ♀ : Fore tarsi narrow.. ... . *heterocnemis* sp. n., p. 381

51 (50) Palpi yellow. Hind tibia testaceous-yellow. Apical quarter or less of fourth tergite pale ferruginous, second tergite broadly or narrowly pale anteriorly on each side of median vitta, first tergite wholly pale. *m-m* strongly oblique, last sector of *m* only slightly longer than last but one. Mid femur with 2 *a* pre-apicals. Wing length *c.* 9 mm. ♀ : Distal three segments of fore tarsi markedly dilated (Fig. 93). *latitarsis* (Stein), p. 383

52 (49) Node at base of r_{4+5} bare on dorsal surface.

53 (64) Palpi pale yellowish-orange, or fuscous with pale yellow apex.

54 (55) Infrasquamal hairs absent or represented by only 2–3 pale hairs.

Anterior *prst dc* longer than second *npl* (Fig. 94). ♂ : Eyes with a conspicuous large-faceted area, separated only by perfectly linear parafrontalia; thoracic vittae not reaching suture. ♀ : Interfrontalia 4–5 times as wide at middle as a parafrontale. *heteromma* sp. n., p. 385

55 (54) Infrasquamal hairs dark and more numerous. ♂ : Eyes with the anterior facets less enlarged. ♀ : Interfrontalia narrower.

56 (57) Abdomen and metanotum wholly pale ferruginous (though the former may become more or less darkened post-mortem). ♀ : Interfrontalia 2–3 times width of a parafrontale ; fore tarsi slightly dilated... .. .. *holoxantha* sp. n., p. 387

57 (56) Abdomen largely piceous-brown to fuscous-black; metanotum more or less browned to piceous.

58 (59) All femora largely piceous-brown. Mesonotum piceous except at shoulders, notopleurae and postalar callosities. Fourth abdominal segment wholly piceous. . .. *varipalpis* sp. n., p. 388

59 (58) At least anterior femora wholly pale. Mesonotum pale ferruginous with or without infuscated vittae, but never uniformly piceous on disc.

60 (61) Fourth abdominal segment wholly piceous. Mesonotum not infuscated. ♂ : Hind femur largely browned.. . ... .. *nigricauda* sp. n., p. 390

61 (60) Fourth abdominal segment pale at tip. Mesonotum more or less infuscated on disc. Femora wholly pale.

62 (63) Palpi fuscous with pale yellow tip. *fulvoapicata* sp. n., p. 391

63 (62) Palpi wholly pale yellow.. *persimilis* sp. n., p. 393

64 (53) Palpi wholly fuscous-brown.

65 (66) Abdomen pale ferruginous with a roundish or transversely elliptical piceous spot on ventrolateral hind margin of fourth segment, this spot extending at least narrowly to dorsolateral surface (Fig. 96). Mesonotum piceous; posterior coxae and femora pale ferruginous, fore femora sometimes largely piceous-brown. *splendida* (Stein), p. 393

66 (65) Abdomen more or less broadly piceous or fuscous on disc without a pair of roundish dark lateral spots on fourth segment. Fore

and posterior femora not much differing in colouration.

67 (70) Coxae and basal half or more of femora piceous, in female sometimes only coxae and extreme base of femora dark, length of wing in this case more than 8·5 mm.

68 (69) Abdomen wholly fuscous. Mesonotum with very conspicuous pale dusted and undusted vittae. Basal half or less of all femora piceous. Infrasquamal hairs absent. ♂: Eyes separated by twice width of third antennal segment. *umbrosa* sp. n., p. 396

69 (68) Base and apex of abdomen pale testaceous. Mesonotum behind suture almost without vittae. Femora wholly piceous. Infrasquamal hairs present. ♂: Eyes closely contiguous. *flavocaudata* Mall., p. 398

70 (67) Femora and coxae wholly pale testaceous, in some females somewhat browned, in this case wings less than 8·5 mm. long. Abdomen with large piceous-black areas. ♂: Eyes closely contiguous.

71 (74) Fourth tergite wholly piceous-black.

72 (73) Infrasquamal hairs present. Mesonotum normally at most somewhat browned, especially on anterior part, vittae therefore not very conspicuous. Coxae and femora wholly pale..... ... *apicalis* (Stein), p. 408

73 (72) Infrasquamal hairs absent. Mesonotum normally strongly infuscated with conspicuous vittae. At most first tergite wholly, second often partly, pale, sometimes abdomen wholly piceous-black. ♀: Coxae and base of femora sometimes browned.. *subumbrosa* sp. n., p. 398

74 (71) Fourth tergite pale ferruginous with or without dark spots. Tarsi largely fuscous.

75 (76) Fourth tergite pale ferruginous with a piceous median vitta and a spot on each side, which may coalesce with the former; intermediate segments with a complete broad median vitta and a large transverse spot on hind margin, which is more or less broadly fused with median vitta... *varicauda* sp. n., p. 400

76 (75) Fourth tergite wholly pale ferruginous* or at most median basal part irregularly piceous-brown (by post-mortem rot), intermediate segments normally with a broad triangular median spot which tends to be narrowly divided on median line. Mesonotum at most browned between paramedian vittae. Arista with longer and denser rays.... ... . *handschini* sp. n., p. 403

77 (33) Fore femur with a row of short strong *av* setae (Fig. 98*a*) or at least with some longer setulae (Fig. 98*b*) on apical part, *or* stem vein on posterior side of dorsal surface with some fine pale hairs (Pl. 2, fig. 12). Never more than 3 *post dc*, these strong. Fore tibia without a *p* seta.†

78 (87) Stem-vein on posterior side of dorsal surface with some fine curved pale hairs.

79 (80) Palpi pale testaceous. Thorax with three white-dusted vittae, the ground-colour more or less infuscated. ♂: Mid femur on apical third with a comb-like row of short strong *av* setae (similar to those of fore femora).. *setifemur* Mall., p. 404

80 (79) Palpi fuscous to brown.

81 (84) Disc of mesonotum not infuscated, or infuscated median area hardly exceeding the *dc* laterally. Second tergite and hind margin of first wholly piceous or wholly rufous with only a small median suffusion.

82 (83) Abdomen piceous with orange-yellow tip, basal part of first segment also sometimes pale ferruginous translucent. Tibiae markedly browned as a rule. ♂: Fore and mid femora (Fig. 49) without a comb of stronger *av* setae; eyes closely contiguous with a conspicuous large-faceted area.. .... *brunneitibia* sp. n., p. 406

83 (82) Abdomen rufous, only often darkened on disc and apex, the tip in these cases not paler. ♂: Fore and mid femora with or without a row of slightly stronger *av* setulae

---

* Fourth tergite wholly pale, *m* rather strongly upcurved: see *D. curvimedia*, para. 88.

† If the tibia has a *p* seta, see *acrostichalis*, para. 38.

near apex; eyes with a rather well-marked large-faceted area. ♀: With a row of somewhat longer *av* setulae near apex of anterior femora, these setulae even less conspicuous than in male.. .. *apicalis* (Stein), p. 408

84 (81) Disc of mesonotum strongly infuscated laterally to almost or fully the *ph*, *prst* and anterior *ia*. Tip of abdomen orange-yellow.

85 (86) Thorax with three conspicuous white-dusted and consequently four conspicuous fuscous vittae. Hind margin of first tergite piceous, second tergite largely piceous with the anterior lateral part more or less broadly pale testaceous. ♂: Fore femur with comb; eyes without a conspicuous large-faceted area, contiguous.. ... .. *pilinervis* Mall., p. 410

86 (85) Thorax broadly dusted whitish-grey in front or with only the beginning of a white-dusted median vitta, disc otherwise broadly and uniformly piceous. Hind margin of first tergite pale testaceous laterally, the pale basal colouration thus extending unbroken from base to at least anterior part of second tergite ... *nigridorsata* sp. n., p. 412

87 (78) Stem-vein without hairs (but with the normal covering pile present on all veins). Femora wholly pale testaceous.*

88 (89) Abdomen and thorax wholly ferruginous. *m* rather conspicuously upcurved, R_5 therefore at apex only three-quarters the width of its widest part (Fig. 99). Palpi fuscous. ♀: Fore tarsus somewhat dilated.. .. *curvimedia* sp. n., p. 413

89 (88) Abdomen more or less piceous. *m* very slightly upcurved at tip, where R_5 is only slightly narrowed.

90 (91) Tip of fourth tergite piceous, rest of abdomen and thorax pale ferruginous, mesonotum somewhat browned in front, the four undusted vittae therefore brown in front of suture. ♂: Hind femur with a row of short *pv* setae on more than apical third.. *melanotela* sp. n., p. 415

---

* Legs piceous-brown. Mesonotum largely piceous, scutellum wholly so. Abdomen with pale ferruginous tip. Palpi fuscous-brown. See *varipalpis* sp. n.

91 (90) Tip of fourth tergite yellowish orange, abdomen otherwise piceous on at least posterior part.

92 (93) Mesonotum with a pair of broad virtually complete piceous vittae, which extend from the *prst* and first *ia* inwards to well beyond the *dc*, not interrupted by vittae of thin dust, the pale dusted median vitta somewhat narrower than the dark vittae, parallel-sided and complete. Fore and mid femora with a row of short black *av* setae towards apex (in female those of fore femur weaker, those of mid femur indistinct). Tip of fourth tergite pale ferruginous. Palpi pale testaceous in male, dull brown in female. . *latistriata* Mall., p. 417

93 (92) Mesonotum without or with paired vittae, in the latter case two pairs of vittae are present in posterior view, which are separated by pale dust on median line and along the *dc*.*

94 (97) ♂: Apical part of hind femur with a row of short but strong *pv* setae similar and in a corresponding position to the *av* ones. ♀: Fore tarsi slender and usually only slightly browned. Mesonotum (♂, some ♀♀) with a broad piceous-brown median vitta,† which is overlaid with brown dust and which is delimited on outer side by the undusted (paler) paramedian vittae, outer vittae absent, in other specimens more extensively infuscated and with four undusted dark vittae. *pahangensis* Mall., p. 421

95 (96) ♂: Apical part of hind femur without a row of *pv* setae, but the *pv* hairs somewhat longer near apex. ♀: Fore tarsi distinctly dilated, piceous-brown. Mesonotum with four dark vittae or without distinct vittae, always paler on median line. Palpi normally orange-yellow. *pendleburyi* Mall., p. 423

---

* If the thorax is wholly orange, the hind femur of the male without a *pv* pre-apical comb, the front tarsi of the female not dilated, see *acrostichalis*, para. 38, which normally has a *p* seta on the fore tibia.

† Vittae as in *pendleburyi*. Palpi brown. Base of r_{4+5} with one or a few small setulae on dorsal surface. Fore tarsus of female somewhat dilated: see *latitarsis* (Stein), of which I have seen a female with a few stronger *av* setae near apex of fore femur.

149. **Dichaetomyia simulans** (Stein).

1910. ! *Mydaea simulans* Stein, *Ann. Mus. nat. Hungar.*, **VIII**, 549 (♀); 1918, l.c., **XVI**, 181. Type: Matheran. Mus. Budapest.

Testaceous with fuscous head and largely fuscous mesonotum, scutellum and apical part of abdomen, dusted fuscous and grey. *Head* dusted grey with a small but distinct shifting dark spot at apical level of second antennal segment; frontal triangle dusted fuscous reaching anterior third of frons; interfrontalia twice as wide at middle as a parafrontale, the latter with only one strong and one very weak inclinate seta, the two reclinate setae not very widely separated from each other; ocellars and inner verticals very strong, outer verticals weak; vibrissal angles slightly more projecting than frons, facial ridges with a few fine short hairs ascending to about middle. Palpi fuscous; lunula and antennae testaceous, third segment infuscate except at base, falling short of mouth-margin by half its own width; arista long-plumose, longest rays almost half as long again as width of third antennal segment. *Thorax* translucent dull testaceous on the *dc* strip and on all the margins of the scutellum; shoulders pale testaceous, pleurae largely infuscated, infra-alar bulla fuscous; mesonotum with linear paramedian and broad outer fuscous vittae on grey-dusted ground, paramedian vittae somewhat broadened posteriorly and becoming less conspicuous, just exceeding the anterior *post dc*; an inconspicuous brown-dusted median vitta extending from level of *post dc* to base of scutellum; *acr* hairs in 7–8 rows in front of suture, *prsc* not very long, behind level of last *dc*; 2+2 strong *dc*, anterior *ia* absent; *pra* distinct, much smaller than second *npl*; *stpl* in an isosceles triangle. *Abdomen* short-ovate, first segment wholly testaceous, second with a suffused infuscated band on posterior part, third and fourth fuscous on dorsal surface with cinereous dust, third with narrow pale fore margin which is interrupted on median line; all segments with two rather strong lateral marginals, third and fourth also with a pair of median marginals, fourth in addition with three discals towards and on lateral surface. *Wings* slightly yellowish-smoky on anterior part, otherwise slightly brownish-smoky; r_1 slightly exceeding level of *r-m*, the latter beyond middle of discal cell; r_{4+5} somewhat sinuous and curved backward near apex, slightly converging with *m*, which is very slightly and gradually bent up at apex. Calyptrae including border and fringe browned, border of the upper one

more strongly so. Halteres testaceous. *Legs* pale testaceous, last three tarsal segments infuscated; fore tibia with 1, mid tibia with 2, *p* setae; hind femur with a strong *av* pre-apical and 1–2 small setae near it, otherwise without *av* or *pv* setae, hind tibia with 1–2 *pd* setulae, a strong *ad* at middle and 1–2 rather weak *av* closely together slightly beyond level of *ad*.

Length.—6·1 mm., of wings 5·8 mm.

Distribution.—INDIA: Matheran (Bombay).

Described from the female type.

150. **Dichaetomyia pallitarsis** (Stein).

1909. *Mydaea pallitarsis* Stein, *Tijdschr. Ent.*, **LII**, 236; 1918, *Ann. Mus. nat. Hungar.*, **XVI**, 153, 180. Type : Batavia. Mus. Amsterdam.

1925. *Dichaetomyia pallitarsis* (Stein), Mall., *Philipp. J. Sci.*, **XXVI**, 324, 325; 1928, *Ent. Mitt.*, **XVII**, 319.

1927. *Dophomala pallitarsis* (Stein), End., *Konowia*, **VI**, 55.

Piceous with testaceous shoulders, tibiae and tarsi; antennae pale ferruginous with infuscated third segment. *Head* with rather densely dusted silver-grey parafrontalia and parafacialia and dull rufous-brown interfrontalia; eyes separated by over a quarter (0·26–0·28) head-width in male and by two-fifths head-width in female, practically bare, frons at middle not or hardly narrower than at vertex, moderately (and only parafrontalia) dilated to lunula, frontal triangle small and pointed, not (♂) or hardly (♀) reaching middle, interfrontalia almost parallel-sided, almost thrice as wide at middle as a parafrontale; the latter with 1 strong, 2–3 weak and a few hair-like inclinate and with 2 reclinate setae, the anterior of which is (in male much) weaker; ocellars strong, inner verticals very strong, outer verticals rather weak; parafacialia about $\frac{1}{3}$, jowls about equal to, width of third antennal segment; the latter falling short of mouth-margin by about its own width; longest rays on dorsal surface of arista almost twice as long as width of third antennal segment, rays on ventral surface much shorter, especially on basal half. *Thorax* not very thickly dusted whitish-grey with four moderately narrow undusted vittae, which are rather broadly and clearly separated in front of suture, but by only narrow indefinite streaks of dust behind suture; *prsc* well developed, 2 rather strong *ia*, the anterior one in front of level of *sa*, *pra* rather small; anterior mesopleural rather conspicuous; postalar declivity and hypopleura bare, infra-squamal hairs black and conspicuous. *Abdomen* thinly and uniformly dusted brown-grey, glossy, second segment

with 2 strong lateral marginals on each side, third and fourth with a row of strong marginals. *Wings* subhyaline with creamy veins, costal spine much longer than *r-m*, the latter slightly before middle of discal cell, apex of r_1 with 0–3 black setulae on dorsal surface, stem-vein and r_{4+5} bare on dorsum, r_{4+5} slightly sinuous at apex, *m* somewhat upcurved, *m-m* almost straight and rather upright, separated from *r-m* by one-and-a-half times its own length, apical angles of discal cell subequal. Calyptrae whitish, subopaque, with whitish or pale yellowish border and fringe. Halteres dull brownish. *Legs* piceous with knees, tibiae and tarsi pale; fore tibia with a rather strong *p* seta; mid tibia with 3 *p* setae, the most proximal one small; hind femur with 2–4 *av* setae at apex, 1–2 of which are strong, hind tibia with 1–3 small *pd* setae, 2 strong *ad*, the distal one being the stronger, and two rather weak *av*.

Length.—5·4–6·4 mm., of wings 4·8–5·6 mm.

Distribution.—MALAYA (Kuala Pilah; Taiping; Bukit Padang). JAVA (Batavia, type). SUMATRA. FORMOSA. PHILIPPINE IS. (Luzon).

151*a*. **Dichaetomyia malayana** Malloch.

(Figs. 86*a*, 87*a* and 88)

1928. ! *Dichaetomyia malayana* Mall., *Ann. Mag. n. H.* (10), **II**, 312. Type: Lubok Tamang. B.M.

1925. *Dichaetomyia* (*armata*) Stein, Mall., *Philipp. J. Sci.*, **XXVI**, 329 (nec Stein); 1928, *Ent. Mitt.*, **XVII**, 325.

Body, legs, antennae and palpi pale ferruginous, head fuscous, mesonotum more or less browned on median line, especially behind, and on a suffused streak along the *ph*, *prst* and *sa*, disc with three conspicuous vittae of rather dense whitish dust, which coalesce towards scutellum, the latter wholly, though not thickly, dusted, apical segments of abdomen piceous. *Head* densely dusted silver-white on face and parafrontalia; eyes with sparse short hairs, separated in male at narrowest part by about one-seventh head-width, hardly broadened to vertex, slightly to lunula, interfrontalia fuscous, very slightly widened towards extremities, parafrontalia conspicuous and of almost equal width everywhere, with 3–4 strong and 2–3 fine inclinate and 2 small reclinate setae, the 'inclinate' setae all conspicuously reclinate and some of them hardly bent inward at all, ocellars small, inner and outer verticals very small and fine though quite distinguishable; frons of female at vertex a quarter head-width, rather strongly

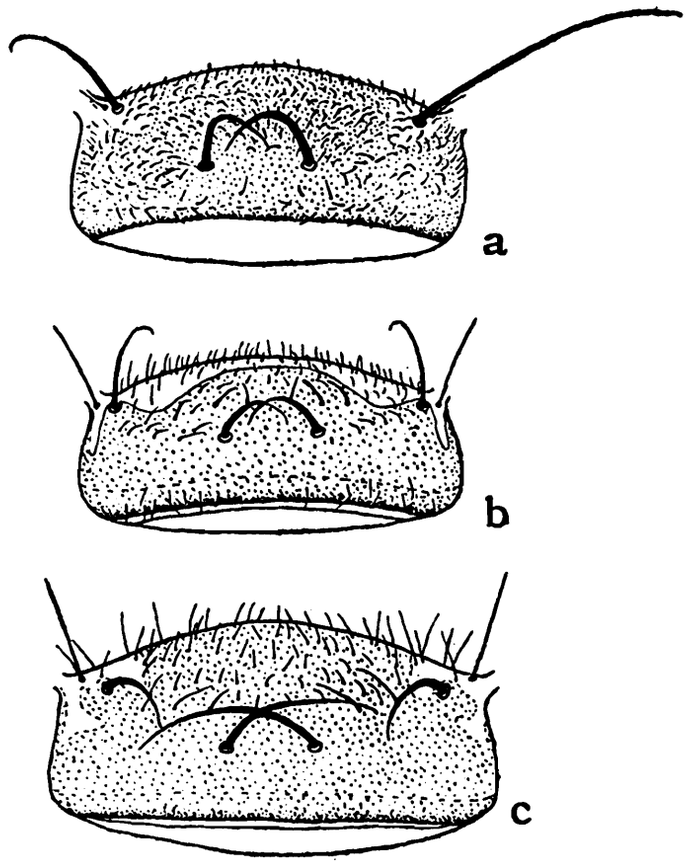


FIG. 86. Apical view of scutellum (undusted parts stippled) of: (*a*) *Dichaetomyia malayana* Mall.; (*b*) *Dichaetomyia bibax* (Wied.); (*c*) *Dichaetomyia indica* (Walk.).

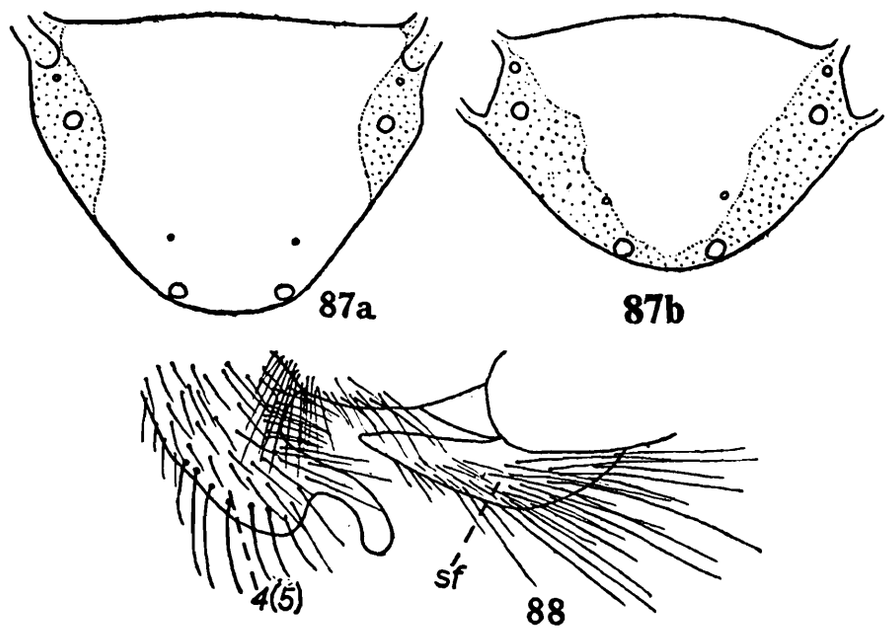


FIG. 87. Dorsal view of scutellum (undusted parts stippled) of: (*a*) *Dichaetomyia malayana* Mall.; (*b*) *Dichaetomyia phaeocnemis* sp. n.

FIG. 88. *Dichaetomyia malayana* Mall., lateral view of male hind end. *4(5)*, fourth (fifth) ventrite; *sf*, superior forceps.

dilated with straight sides to lunula, where it is a third head-width, parafrontalia one-third width of interfrontalia at middle, of almost even width throughout with 2 strong and 1–2 very small inclinate setae, ocellars and inner verticals strong, outer verticals very weak; parafacialia hardly a third width of the slender third antennal segment, which is as wide as the jowls and falls short of mouth-margin by fully its own width; arista densely long-plumose to apex, longest rays thrice as long as width of third antennal segment. *Thorax* somewhat browned on dorsal surface; shoulders, etc., paler and conspicuously dusted; *prsc* small, anterior *prst dc* and anterior two *post dc* markedly smaller but quite strong, anterior *ia* well developed, *pra* sometimes very weak; anterior mesopleural well developed, infrasquamal hairs absent, postalar declivity with a few, hypopleura both below spiracle and above hind coxa with rather numerous, black hairs. *Abdomen* glossy with rather thin grey dust, apical two segments piceous or fuscous on dorsum, third segment, however, sometimes with pale anterior angles, second sometimes suffusedly dark on median posterior part, third and fourth segments with a pair of strong median marginals and 1–2 weaker marginals towards sides, fourth also with 2 strong discals on each side. *Wings* strongly yellowish-smoky; costal spine small, veins bare on dorsal surface; r_1 somewhat exceeding level of *r-m*, which lies at middle of discal cell, *m* very slightly upcurved at tip. Calyptrae pale reddish-creamy, subhyaline, with pale ferruginous border and pale golden fringe. Halteres pale reddish-yellow. *Legs* with only the apical segments of the tarsi infuscated; fore tibia in male without submedian seta, in female with a small *ad* and a slightly stronger *p* seta somewhat basad of middle; mid femur of female without outstanding *av* or *pv* setae, mid tibia with 2–4 *p* setae; hind femur in addition to the *ad* row in male with a row of small *av* setae, of which the 2–3 pre-apical ones are stronger, in female with similar pre-apical setae but otherwise with at most a few odd *av*, *pv* surface with a few small setae, 1–2 of which are stronger in male, hind tibia with 2 weak *pd* setae, 1–2 small *av* and 2 *ad*, the distal one being the strongest of the submedian setae.

Length.—6·2–7·7 mm., of wings 5·8–7·9 mm.

Distribution.—MALAYA (Pahang). INDIA (Assam; S. India). PHILIPPINES (as *armata*) (Mindanao; Luzon).

The female of this species is probably the Philippinian form which Malloch identified with some doubt, since he had not seen males, as *armata*. The Oriental males at hand do not have the distinctive spine, etc., of the hind femora of

armata, and as far as I know *armata* does not occur in this region.

151*b*. **Dichaetomyia malayana tamil** ssp. n.

♂ ♀: Structural characters exactly as in the type form. Mesonotum with a pair of narrow fuscous vittae, which are overlaid with whitish dust, on the line of the *dc*, and a white-dusted median vitta becoming narrower and fainter towards and behind suture, not coalescing with the paired vitta. Third and fourth abdominal segments not markedly darkened, but genital segments of male fuscous as in the type form, therefore strongly contrasting. Fourth ventrite and the forcipes, especially the very long and slender dark brown inferior forceps, as in the type form. Mid femur of male with 2–3 strong *pv* setae near base, which are not present or very weak in female; hind femur of male with the *av* setae extending only over apical half.

Length.—5·6–7·3 mm., of wings 5·2–7·4 mm.

Distribution.—CEYLON: Lady Horton's Drive, Kandy, C.P., 4.II.54 (*F. Keiser*), ♂ type, 30.X.53, 1 ♀ paratype; Hakgala, C.P., 1,800–1,900 m., 31.V.53, 1 ♀ paratype (type and Hakgala paratype in Mus. Basle, Kandy paratype in B.M.); Suduganga, 28.VIII.18, on window (*R. Senior White*), 1 ♀ paratype (in B.M.).

152. **Dichaetomyia senior whitei** sp. n.

♂ ♀: Fuscous-brown with the shoulders, pleurae, lateral part of scutellum and base of abdomen more or less dull testaceous, antennae (third segment largely infuscated), trochanters, knees, tibiae and tarsi pale ferruginous; dorsum rather densely dusted grey and brownish-grey with very narrow dark thoracic vittae. *Head* dusted pale brownish-grey with silver-white parafacialia and parafrontalia; eyes practically bare, frons of male at middle one-ninth head-width, very slightly dilated to vertex, moderately to lunula, interfrontalia reddish-fuscous, more than twice as wide at middle as a parafrontale, frontal triangle small and pointed, parafacialia with a strong inclinate seta at lunula, followed by two much weaker ones and by four setulose hairs evenly spaced to level of anterior ocellus, ocellars strong, verticals indistinct; frons of female at vertex three-tenths (0·31) head-width, rather strongly dilated with straight sides to lunula, where it is 0·36 times head-width, frontal triangle slightly shining, fading out in front of middle, interfrontalia somewhat narrowed to extremities, thrice as wide at middle as a

parafrontale, the latter with 1 strong and 3 weak inclinate setae on more than anterior half, and rather numerous black proclinate setulae on outer part, which are arranged in a double row anteriorly, ocellars and inner verticals strong, outer verticals small; parafacialia very narrow below, facial ridges with a row of small hairs on the entire length; jowls only slightly wider than third antennal segment; the latter falling short of mouth-margin by less than its own width; arista long-plumose, longest rays more than half as long again as width of third antennal segment. Palpi rather slender. *Thorax* with linear paramedian vittae which are fuscous and undusted and very widely separated in front of suture and on a small spot just behind it, but brown-dusted from there to level of first strong *post dc*, outer vitta forming a somewhat oblique streak in front of suture and a narrow fuscous vitta between the *post dc* and the *ia*, another fuscous vitta on the declivous lateral part and a faint brown-dusted median vitta from scutellar suture to level of anterior strong *post dc* and extending rather broadly to tip of scutellum and its underside; anterior *prst* and *post dc* very small, anterior *ia* at level of second weak *post dc* and anterior to that of *sa*, *pra* small; anterior mesopleural distinct, postalar declivity apparently bare, infrasquamal hairs present. *Abdomen* in posterior view densely dusted grey with a linear fuscous median vitta on posterior half of each segment and some brown dust along hind margins, especially of the last segments, in female more thinly dusted and without a pattern; anterior two segments with 1–2 strong lateral marginals, third with some lateral discals and a row of strong marginals, fourth with a row of strong discals and marginals. *Wings* rather strongly tinged brownish-yellow with testaceous veins; stem-vein setulose above and below; *r-m* level with apex of r_1 and well beyond middle of discal cell; apex of r_{4+5} virtually straight, of *m* very slightly upcurved; *m-m* almost straight and rather upright. Upper calyptra brownish-cream, lower one brownish with brown border and golden fringe. *Legs* with coxae and femora largely brown, fore tibia with one, mid tibia with two, *p* setae; hind femur apart from the *ad* row with 2–3 outstanding setae only at apex of *av* surface, hind tibia with 1–2 small *pd* setae, a rather strong *ad* and 2 rather small *av*.

Length.—4·7–5·2 mm., of wings 4·5–5·3 mm.

Distribution.—CEYLON: Suduganga, 9.XII.19 (*R. Senior White*), ♂ type, 1 ♂ paratype (in B.M.); Ambacotta, C.P., 15.XII.53 (*F. Keiser*), 1 ♀ paratype (in Mus. Basle).

The hairs on the stem-vein are an exceptional character of this species in the group with setulose lower margin of the scutellum. In Stein's key *senior whitei*, which the British Museum obtained with the Senior White collection, would be traced to *addita*, a species now placed in the subgenus *Helina*.

153. **Dichaetomyia keiseri** sp. n.

♂ ♀: Fuscous with pale testaceous tibiae and tarsi, apical fifth of femur suffusedly pale testaceous; dorsum moderately densely dusted brownish-grey with narrow undusted fuscous thoracic vittae. *Head* rather densely dusted pale brownish-grey, parafacialia and parafrontalia, the latter in female only anteriorly, with silver-white dust; eyes almost bare, in male separated by $\frac{1}{12}$ head-width, interfrontalia about half as wide in posterior half as third antennal segment, gradually somewhat dilated to lunula, parafrontalia almost linear in posterior half, gradually somewhat dilated to thrice their posterior width, with 3 rather strong inclinate setae on anterior fourth, followed by 3 small ones, a reclinate setula at level of anterior ocellus and a smaller one in front of it, almost halfway between it and the last inclinate setula, ocellars strong, verticals very weak but markedly longer than the occipital setulae; frons of female at vertex more than a quarter (0·28) head-width, rather strongly dilated with straight sides to lunula where it is more than a third (0·36) head-width, frontal triangle rather well defined, somewhat shining, fading out about anterior quarter of frons, interfrontalia evenly and slightly narrowed to extremities, two-and-a-half times as wide at middle as a parafrontale, the latter with 5–6 inclinate setae, which are very weak except for one at lunula and one near anterior third, outer part with an irregular row of black proclinate setulae, most of which are minute, ocellars very strong, inner verticals strong, outer verticals weak but distinct; parafacialia linear in lower half if seen in profile, jowls as wide as third antennal segment; the latter falling short of mouth-margin by half its own width; arista long-plumose, longest rays half as long again as width of third antennal segment. *Thorax* with the paramedian undusted vittae in male not exceeding second (small) *post dc*, in female the vittae in a certain direction appearing faintly continued to last *dc*, outer vitta between *dc* and *ia* broader and broadly interrupted at suture, an even broader irregular vitta present between *ia* and *sa*; *prsc* rather small, anterior *prst dc* almost hair-like, anterior *ia* conspicuous, somewhat in front of level of *sa*, *pra* small, anterior mesopleural distinct, postalar declivity bare,

infrasquamal hairs present, rather long. *Abdomen* uniformly dusted greyish-brown, densely so and therefore matt in male, thinly so and shining in female, first segment of male with an undusted tapering median vitta; anterior two segments with rather strong lateral marginals, which on second segment of male are joined by a row of weaker marginals, third and fourth with a row of strong marginals, fourth, and in male third, also with a row of strong discals, the other segments only with lateral discals. *Wings* in male rather strongly tinged brownish-yellow, subhyaline, veins testaceous; r_1 slightly exceeding level of *r-m*, which lies not much beyond middle (♀) or towards three-fifths (♂) of discal cell; apex of r_{4+5} straight, of *m* very slightly upcurved; *m-m* rather straight and upright. Lower calyptra greyish-brown subopaque, more strongly browned towards the dark brown margin, fringe brown. *Legs* with paler, testaceous-brown trochanters, fore tibia with 1, mid tibia with 2 *p* setae; hind femur on apical half with 4–5 *av* setae and on intermediate third with 1–2 fine *pv* setae, hind tibia with 2 small *pd* setae, at middle a rather strong *ad* and, slightly beyond, 1–2 *av* setae.

Length.—5·6–6·1 mm., of wings 5·7–6·2 mm.

Distribution.—CEYLON: Nanu Oya, C.P., 20.XI.53 (*F. Keiser*), ♂ type, 2 ♂ 1 ♀ paratypes (type in Mus. Basle, paratypes there and in B.M.).

154. **Dichaetomyia phaeocnemis** sp. n.

(Fig. 87*b*)

♀: *Head* fuscous, disc of mesonotum and apical part of abdomen piceous; lateral part of mesonotum, pleurae, except for some spots, base of abdomen, palpi, fore legs, mid and hind coxae, trochanters, tibiae and tarsi pale ferruginous, mid and hind tibiae somewhat browned, antennae pale testaceous. *Head* densely dusted pale grey, the dust more silvery on parafacialia; eyes sparsely short-haired, separated at vertex by about one-fifth, at lunula by about three-tenths head-width, interfrontalia very slightly dilated forward, 1·5–2 times width of a parafrontale at middle, parafrontalia evenly broadened forward, with 1 strong and 1–2 weak inclinate setae; ocellars and inner and outer verticals strong; parafacialia hardly wider below than base of arista; third antennal segment reaching to about mouth-margin, arista long-plumose, with numerous long rays almost to tip, longest rays fully half as long again as width of third antennal segment. Palpi

ochraceous, strongly laterally compressed and dilated, about as wide as third antennal segment. *Thorax* broadly piceous on disc up to the *prst* and *sa*, with a moderately broad white-dusted vitta on the *dc* strip and the beginning of a median one at neck, sternopleura and hypopleura largely infuscated, mesopleura usually with a suffused brown spot, scutellum somewhat browned on base and disc; *prsc* well developed, anterior *prst dc* somewhat shorter than the rest, anterior *ia* slightly in front of level of *sa*, *pra* small; anterior mesopleural distinct, postalar declivity setulose. *Abdomen* glossy pale ferruginous, the last two tergites almost wholly piceous, only the lateral anterior part of the third narrowly pale and the hind margin of the fourth sometimes narrowly reddish translucent, second tergite more or less browned on median line or on most of disc; third segment with a marginal row of not very strong setae, fourth with an interrupted row of discals and a row of strong marginals. *Wings* yellowish-grey hyaline, with testaceous veins, which are bare on dorsal surface; apex of r_1 markedly exceeding level of *r-m*, which lies at or just beyond middle of discal cell; r_{4+5} slightly sigmoid at apex, *m* slightly upcurved; *m-m* moderately oblique and outwardly concave. Calyptrae pale brownish with cream border and pale golden fringe. Halteres pale reddish-yellow. *Legs* pale ferruginous with piceous mid and hind femora, pale knees and browned posterior tibiae; mid and hind femora with a row of short *pv* setae on basal half, hind femur also with about 3 strong *av* pre-apical setae; mid tibia with the 4–5 *p* setae almost in line, the 2–3 smaller ones slightly more *pd* in position; hind tibia with 2–3 small *pd* setae, an *ad* and 2 small *av*.

Length.—5·6–6·7 mm., of wings 5·8–6·9 mm.

Distribution.—MALAYA: Fraser's Hill, 4,000 ft., Pahang, 28.I.29 (*H. M. Pendlebury*), ♀ type, 1 ♀ paratype in B.M.; 25.I.29, 1 ♀ paratype (in U.S. Nat. Mus., Washington) (*B. A. R. Gater*), 1 ♀ paratype; Kedah Peak, 3,300 ft., 19.III.28 (*H. M. Pendlebury*), 2 ♀ paratypes; Bukit Kutu, 3,500 ft., Selangor, 20.IV.26 (*H. M. Pendlebury*), 1 ♀ paratype; Kuala Lumpur, Selangor, 19.II.26, at light (*H. M. Pendlebury*), 1 ♀ paratype (all in B.M.).

Very closely related to *quadrata* (Wied.) and *nubiana* (Big.). As the dark colouration of the femora is always accompanied by the higher number of setae on the mid tibiae, there can be little doubt that *phaeocnemis* is a good species. Stein's key would separate it widely from those species and would place it near *alterna* (Stein) and *dimidiata* (Stein), which have all femora dark and differ by other details of colouration.

155*a*. **Dichaetomyia nubiana** (Bigot).

1885. ! *Spilogaster nubianus* Bigot, *Ann. Soc. ent. France* (6), **IV**, 288. Type: Khartoum, Coll. Collin, Newmarket.
1885. ! *Spilogaster pruinosus* Bigot, *ibid.*, 287. Type: Ceylon. Coll. Collin, Newmarket (n. syn.)
1904. *Spilogaster lineata* Stein, *Tijdschr. Ent.*, **XLVII**, 102 (♂). Type: Java. Mus. Amsterdam.
1951. *Dichaetomyia quadrata nubiana* (Big.), Emden, *B.M. Ruwenzori Exp.*, 1934-5, **II**, 681.

Very closely related to *D. phaeocnemis* and *quadrata*. Head and disc of mesonotum, laterally to almost the *ph* and *ia* and in male even to the *prst* and beyond the *ia*, fuscous, otherwise pale testaceous or pale ferruginous, including scutellum and legs, pleurae normally with some fuscous suffusions, especially on sternopleura and hypopleura; palpi often browned, third antennal segment of female somewhat brownish, except at base; third and fourth abdominal segments usually more ferruginous, sometimes irregularly browned by post-mortem rot. *Head* of male with almost contiguous large practically bare eyes, interfrontalia obsolete, except at lunula, parafrontalia narrow, densely dusted silver-white, with about 5 inclinate setae on more than anterior half and with 2 small reclinate hairs towards anterior ocellus, ocellars not very strong, verticals indistinct; frons of female a quarter head-width at vertex and a third at lunula, otherwise as in *phaeocnemis*; parafacialia about a third width of third antennal segment, the latter falling short of mouth-margin by almost its own width; arista densely long-plumose, longest rays fully twice as long as width of third antennal segment. *Thorax* with hairs and setae as in *phaeocnemis*, the dusted median vitta well developed to scutellar suture, and the infuscated part somewhat less broad, at least in female. *Abdomen* of male with a marginal row, of female with only lateral marginals on the third segment, fourth segment with an incomplete row of discals and with a marginal row. *Wings* subhyaline, greyish with testaceous veins, which are bare on dorsal surface except for the node of r_{4+5} which sometimes bears 1–2 minute hairs; apex of r_1 somewhat exceeding level of *r-m*, which lies slightly beyond middle of discal cell; r_{4+5} somewhat sigmoid at apex, extreme tip of *m* distinctly upcurved; *m-m* in male rather strongly, in female moderately, oblique and outwardly concave. Calyptrae greyish-yellow with cream-coloured border and pale golden fringe, lower one opaque. Halteres pale reddish-yellow. *Legs* pale ferruginous; mid tibia normally with only 2 *p* setae, chaetotaxy otherwise as in *phaeocnemis*.

Length.—5·7–7·8 mm., of wings 5·4–7·3 mm.

Distribution.—CEYLON. S. INDIA (to Bombay and Vizagapatam). N. INDIA (United Provinces (Uttar Pradesh); Sukna, E. Himalayas). NEPAL. BURMA (Narcondam Is.). JAVA (Stein). SUMATRA (Malloch ?). Entire ETHIOPIAN REGION.

I have seen the types of *nubiana* and *pruinosa* and can state that the latter is identical with *nubiana*. If page priority were to prevail strictly, the name would therefore have to be changed again. However, there are presumably even older names for this common widely distributed species, and frequent changes of names can only retard the progress of scientific work.

155*b*. Dichaetomyia nubiana aureomarginata ssp. n.

♂ ♀: Very similar to *nubiana*, the dark colouration of the mesonotum in female often extending to the *prst* and *sa* on each side; palpi dull brown to fuscous-brown. *Head* of male with contiguous eyes, the parafrontalia being linear at middle, the inclinate setae not reaching middle, otherwise as in *nubiana*. *Thorax* with the infuscated part of the mesonotum normally reaching rather far towards sides in female, base and disc of scutellum sometimes browned; otherwise as in *nubiana*. *Abdomen* translucent pale testaceous or ferruginous on basal two segments with the posterior median part of the second often more or less darkened, posterior two segments piceous with the apical margin of the fourth pale ferruginous (the marginal setae separated from the dark part by a rather broad pale band) and often the outer part of the fore margin of the third narrowly pale; setae as in *nubiana*, marginal row of third segment sometimes complete even in female. *Wings* yellowish-grey, more markedly yellowish along fore margin, veins as in *nubiana*, *m-m* rather strongly oblique and sinuous. Calyptrae a little more brownish-grey than in *nubiana*. *Legs* as in *nubiana*.

Length.—6·4–8·3 mm., of wings 6·8–8·7 mm.

Distribution.—MALAYA: Larut Hills, 3,700–4,000 ft., Perak, 11.II.32 (*H. M. Pendlebury*), ♂ type; Batang Padang, Jor Camp, 1,800 ft., Perak, 4.VI.23 (*H. M. Pendlebury*), 1 ♀ paratype; Kedah Peak, 3,300 ft., 19.III.28 (*H. M. Pendlebury*), 3 ♀ paratypes; Bukit Kutu, 3,300–3,500 ft., 18.IV.26, 9.IX.29, 28.IX.32 (*H. M. Pendlebury*), 3 ♀ paratypes; Kuala Lumpur, Selangor, VII.21 (*H. M. Pendlebury*), 1 ♂ paratype. INDIA: Lower Ranges, N. Khasi Hills, Assam, 1878 (*A. Chennell*), 1 ♂ paratype. S. SUMATRA: Mt. Tangyamoes,

Lampong *c.* 1,500 ft., VII.35, 1 ♂ paratype. W. JAVA: Djampang Tenggah, Preanger, V.36, 1 ♂ paratype. (Type in B.M., paratypes in B.M. and U.S. Nat. Mus., Washington).

The general appearance of *aureomarginata* is that of a luxuriant mountain race of *nubiana*, and the localities indicate a mutually exclusive distribution except for the fact that the type locality of *D. lineata* (Stein) is apparently *'Java'*. In one of the specimens from Bukit Kutu the median infuscation of the mesothorax does not exceed the outer margin of the undusted paramedian vitta.

156. **Dichaetomyia peroë** (Walker).

1849. ! *Anthomyia peroë* Walk., *List. Dipt.*, IV, 939, ♀. Type: Madras. B.M.
1901. *Spilogaster peroë* (Walk.), Stein, *Zeit. Hymen. Dipt.*, I, 203.

Very closely related in every respect to *D. nubiana*, all the structural characters being exactly identical as far as I can see. The fourth tergite is, however, devoid of the thin dust of the preceding tergites (where it is especially fine and inconspicuous in this species). *Head* as in *nubiana*, palpi pale orange (third antennal segments of type lost). *Thorax* pale ferruginous with paler shoulders, etc., mesonotum with the usual three white-dusted vittae, pleurae wholly pale except for the fuscous triangular sclerite below the infra-alar bulla. *Abdomen* with the basal two segments wholly pale ferruginous, third pale ferruginous at base, piceous on hind margin, which occupies slightly more than a third of the length at sides and almost the entire length on median line, fourth segment entirely glossy piceous except for a narrow pale fore margin on lateral fourth. *Wings* and calyptrae as in *nubiana*, the setulae on underside of r_{4+5} reach almost, or exceed slightly, *r-m*. *Legs* as in *nubiana* (middle legs of type lost).

Length.—7·5 mm., of wings 7·8 mm.

Distribution.—INDIA: Madras.

The left fore leg of the type is stuck on in the place of the right middle leg. The second specimen from *'East India'*, 'from Archdeacon Clerk's collection', mentioned in the description as the doubtful male of *peroë*, is a different species as already stated by Stein (1901). It belongs to subgenus *Panaga* Curran, and can therefore be only an African species, probably *D. cuthbertsoni* Emd., although the colouration of the abdomen is intermediate between that species and *mallochi* Emd.

157*a*. Dichaetomyia quadrata (Wiedemann).

1824. *Anthomyia quadrata* Wied., *Anal. ent.*, 52; 1830, *Aussereur. zweifl. Ins.*, II, 428. Types: Java. Mus. Copenhagen and Vienna.
1857. ! *Aricia inaperta* Walk., *Proc. Linn. Soc. Lond.*, I, 129. Type: Borneo. B.M. n. syn.
1901. *Spilogaster inaperta* (Walk.), Stein, *Zeit. Hymen. Dipt.*, I, 197.
1913. *Mydaea quadrata* (Wied.), Stein, *Ann. Mus. nat. Hungar.*, XI, 504; 1918, l.c., 153, 171, 183, 185.
1925. *Dichaetomyia quadrata* (Wied.), Mall., *Philipp. J. Sci.*, XXVI, 324, 329; 1918, *Ent. Mitt.*, XVII, 324.
1927. *Lophomala quadrata* (Wied.), End., *Konowia*, VI, 55.

Distinguishable from *nubiana* only by the presence of 4 *post dc*. The palpi are dark brown in the specimens at hand. Otherwise the description of *nubiana* fits the present form exactly.

Distribution.—CEYLON (Paradeniya). N.E. INDIA (Mungpoo, 2,200 ft., Sikkim). MALAYA (Bukit Kutu, Selangor). SUMATRA (Fort de Kock). JAVA (type). BORNEO (type of *inaperta*). FORMOSA (Koshun; Chip-Chip). PHILIPPINES (?).

Stein considered with some doubt *nubiana* (his *lineata*) a synonym of *quadrata*. Malloch (1928) was rather reluctant to accept this synonymy. Since typical *quadrata* (with four *post dc*) do not occur in the Ethiopian region, where *nubiana* is widely distributed and not uncommon, I considered at least the Ethiopian specimens with 3 *post dc* a well-defined form. The material is still insufficient for clearing up the question, as only a few specimens of *quadrata* s. str. are available. The number of *post dc*, though usually a reliable character for grouping Muscidae, is not in every group entirely consistent. In the present genus, however, no cases of variation of these bristles are known and no intermediate specimens (with a fourth *dc* on only one side or with a weak fourth *dc*) have been found. Though the occurrence of both *quadrata* and *nubiana* in Ceylon seems to be certain, this is not entirely the case with regard to Java and Sumatra, Stein's type of *lineata* belonging to a collection which is only summarily said to come from Java, and Malloch's specimen from Sumatra possibly belonging to ssp. *auromarginata*. The most interesting new facts are perhaps the distribution of the two 'variations' *auromarginata* and *monticola* and the other constant differences shown by them beside that of the *dc*. It would seem prudent, therefore, to treat *nubiana* and *quadrata* as separate species for the time being.

157*b*. **Dichaetomyia quadrata monticola** ssp. n.

♂ ♀: Coloured like *D. nubiana*, but the palpi dark brown, the last two abdominal segments wholly piceous-black except sometimes for a linear seam of the fourth (the marginal setae lying on the piceous part) and a narrow basal strip on lateral part of the third, fourth quite undusted and glossy, except on extreme base of lateral part, second segment broadly piceous-brown on median part. *Head* of male with subcontiguous eyes, the interfrontalia linear, almost obsolete at middle, the parafrontalia very narrow, almost linear on posterior half, with 5 inclinate setae, which do not reach middle, the first strong, the second rather strong, the others very weak; frons of female as in *nubiana*, but the sides more convex. *Wings* somewhat yellowish along fore margin, venation as in *nubiana*, *m-m* somewhat more oblique and sinuous. Calyptrae a little more brownish than in *nubiana*. *Legs* as in *nubiana*.

Length.—6·8–7·3 mm., of wings 6·9–7·6 mm.

Distribution.—MALAYA: Lubok Tamang, 3,500 ft., Pahang, 28.III.24 (*H. M. Pendlebury*), ♂ type; Sungai Rotan, Cameron's Highlands, 4,700 ft., Pahang, 24.V.31 (*H. M. Pendlebury*), 1 ♀ paratype (badly damaged by *Anthrenus*); Bukit Kutu, 3,500 ft., Selangor; 12.IV.26 and 10.IX.29 (*H. M. Pendlebury*), 2 ♀ paratypes. (Type in B.M., paratypes in B.M. and U.S. Nat. Mus., Washington).

158. **Dichaetomyia dichaeta** sp. n.

♀: Pale ferruginous, the head and abdomen largely fuscous. *Head* fuscous with the lower half of occiput and mouth-margin pale ferruginous translucent, densely dusted pale cinereous-grey, parafacialia silver-dusted with a small darkish shifting spot at level of second antennal segment; eyes sparsely short-haired, separated at vertex by more than a quarter, at lunula by almost two-fifths, head-width, frontal triangle dusted grey, narrow, exceeding middle of frons, interfrontalia considerably narrowed behind, slightly in front, twice as wide as a parafrontale at middle, parafrontalia with one strong and 3–4 weak to very weak inclinate setae, ocellars and inner verticals very strong, outer verticals weak but rather distinct; parafacialia a quarter, jowls three-quarters, width of third antennal segment, vibrissal angles markedly produced, third antennal segment almost wholly infuscated, falling short of mouth-margin by almost half its own width; arista long-plumose, longest rays a quarter longer

than width of third antennal segment; palpi dull brown. *Thorax* moderately densely dusted brownish-grey, with two pairs of not very conspicuous, moderately narrow vittae, the paramedian ones fading out at level of first strong *post dc*, the outer ones interrupted at suture; *prsc* well developed, anterior *prst dc* about a third length of the posterior one, anterior *post dc* indistinct, anterior *ia* not very strong, distinctly anterior to level of first strong *post dc* and *sa*; *pra* weak; anterior mesopleural well developed, postalar declivity bare, hypopleura bare above but with some very fine short hairs above hind coxa. *Abdomen* densely dusted grey, first segment pale ferruginous except for a linear dark hind margin, the other segments evenly fuscous, tip of fourth narrowly pale ferruginous, anterior segments with lateral marginals, third with a marginal row consisting of three pairs of setae, which lie on inconspicuous brown-dusted spots, fourth with a discal and a marginal row. *Wings* yellowish-grey subhyaline with ochraceous veins, all of which (except *c*) are bare above, *r-m* somewhat infuscated; r_1 reaching level of *r-m*, the latter at almost three-fifths of discal cell, apex of r_{4+5} conspicuously downcurved and somewhat sinuous, apex of *m* somewhat upcurved; *m-m* virtually straight and rather upright. Calyptrae pale brownish with creamy-brown border and pale golden fringe. *Legs* pale ferruginous including tarsi, metatarsi fully as long as rest of the tarsi, (fore legs of type missing), mid tibia with 2 rather strong *p* setae; hind femur with 3 rather strong *av* pre-apicals, otherwise without *v* setae, hind tibia with 2 very small *pd* setae and at middle an *ad* and 2 small *av*.

Length.—6·3 mm., of wings 6·1 mm.

Distribution.—S. INDIA: Coonoor, Nilgiris, 15.IX.20, in garden among grass (*R. Senior White*), ♀ type (in B.M.).

In Stein's key *dichaeta* will be traced to *simulans*, but in that species the anterior *ia* is absent, the *stpl* are arranged in an isosceles triangle, and the mesonotum and scutellum are largely fuscous in ground-colour.

159. **Dichaetomyia curvivena** sp. n.

♂ : Largely fuscous with brownish-grey dust, shoulders, parts of the pleurae and of the lateral region of the mesonotum, margins of scutellum, and first abdominal segment pale ferruginous, legs wholly pale ferruginous. *Head* densely dusted brownish-grey, parafacialia dusted silver with a shifting dark spot at level of second antennal segment, eyes practically bare, separated at vertex by almost a third, at lunula by

almost two-fifths, head-width, frontal triangle moderately broad, exceeding middle of frons, dusted grey with dark undusted median line, interfrontalia at middle fully thrice width of a parafrontale, somewhat narrowed to extremities; parafrontalia with one strong and 2–3 small inclinate setae; ocellars and inner verticals strong, outer verticals small but distinct; parafacialia fully one-third as wide as, jowls a little wider than, third antennal segment, facial ridges with a row of fine setulae extending to above middle. Third antennal segment falling short of mouth-margin by half its own width, infuscated, except at base, basal antennal segments testaceous, arista long-plumose, longest rays half as long again as width of third antennal segment. Palpi dark brown. *Thorax* rather densely dusted grey with the disc more brownish-grey, with faint indications of a brown-dusted median vitta from scutellum to level of anterior strong *post dc* and with six moderately broad darker grey vittae which are overlaid with some brown dust; *prsc* small, first *prst dc* two-thirds length of second, first *post dc* very weak, about a quarter length of second, the other *dc*, the *sa* and the inner postalar very strong, anterior *ia* not very strong, anterior to level of *sa* and level with second *post dc*, *pra* small; anterior mesopleural well developed, postalar declivity with a few very fine small hairs, hypopleura with some small hairs above hind coxa. *Abdomen* as in *dichaeta* but with slight brownish dots at the pores of the hairs and more conspicuous brown dots at the base of the setae and stronger hairs, among these 1–2 on each side of disc of second and third segments, segments 2–4 besides with an indication of a brown median vitta. *Wings* subhyaline, somewhat brownish-grey, with ochraceous veins, *r-m* markedly infuscated and oblique; upper side of veins bare; r_1 reaching level of *r-m*, which lies slightly beyond middle of discal cell; r_{4+5} slightly downcurved and hardly sinuous, *m* conspicuously upcurved in apical fourth of last section, *m-m* almost straight and rather upright. Calyptrae pale greyish-brown, with paler base, creamy border and pale golden fringe. *Legs* pale including tarsi and coxae, fore tibia without a *p* seta; mid femur with about 6 longer *pv* hairs on basal half, mid tibia with 2 rather strong *p* setae; hind femur with 4 strong *av* pre-apicals, hind tibia with 2 very small *pd* setae and an *ad* and 2 small *av* at middle.

Length.—6·8 mm., of wings 6·2 mm.

Distribution.—S. INDIA: Pirmed, 3,400 ft., Travancore, 6.V.37 (*B.M.-Colombo Mus. Exped. to S. India*), ♀ type (in B.M.).

In Stein's key this species will also be traced to *simulans*, which differs from it by the absence of the anterior *ia* and the isosceles triangle formed by the *stpl.*

160. **Dichaetomyia dorsocentralis** sp. n.

♂ ♀: Piceous-brown, only the shoulders, pleural sutures, base of antennae and the tibiae and tarsi pale ferruginous. *Head* brownish-grey dusted with silver-white dusted parafrontalia and parafacialia, the latter with only a slight small shifting dark spot; eyes almost bare, in male separated by one-eighth head-width, interfrontalia fuscous-black, slightly dilated in front and behind, parafrontalia very narrow to almost linear above and at middle, moderately dilated in front, with 5 inclinate setae on more than anterior half and 2–3 small reclinate setae between them and anterior ocellus, the last reclinate seta, somewhat stronger, at level of anterior ocellus, ocellars long and strong, inner and outer verticals very weak, indistinct; frons of female three-tenths head-width at vertex, almost two-fifths at lunula, frontal triangle reaching middle, undusted and shining, interfrontalia parallel-sided, about four times as wide at middle as a parafrontale, the latter evenly and slightly dilated forward, with 3–4 inclinate setae, ocellars and inner verticals strong, outer verticals rather short; parafacialia half as wide, jowls half as wide again, as third antennal segment, the latter falling short of mouth-margin by almost half its own width; arista densely long-plumose, longest rays almost twice as long as width of third antennal segment, but tips of rays bent towards tip of arista. Palpi brown. *Thorax* in front of suture with rather dense pale grey dust, which appears bluish or greenish in places, and a pair of widely separated linear brown paramedian vittae, the outer vittae moderately broad but ill-defined. *post* part largely dusted brown, without a distinct pattern, scutellum thinly dusted brown-grey; *prsc* very weak, anterior *prst* and anterior two *post dc* only twice as long as the adjacent hairs, anterior *ia* moderately strong, at level of second *post dc* and very slightly anterior to level of *sa*, *pra* small; anterior mesopleural well developed, postalar declivity with a few minute hairs. *Abdomen* uniformly and rather thinly dusted grey-brown, anterior segments with rather conspicuous lateral marginals and distinct lateral discals, third and fourth with a complete row of strong marginals, fourth also with a row of strong discals, which may be interrupted on disc. *Wings* brownish-grey subhyaline with testaceous veins; these are bare on dorsal surface; r_1 just reaching level of

r-m, which lies well (♂) or slightly (♀) beyond middle of discal cell; r_{4+5} slightly curved down and not or hardly sinuous at apex, *m* very slightly upcurved at tip, *m-m* straight and rather upright. Lower calyptrae greyish-brown subopaque, more browned towards margin, with pale brown margin and golden fringe. *Legs* with piceous-brown coxae and femora; knees, trochanters, tibiae and tarsi pale ferruginous; fore tibia without submedian setae; mid femur with a row of longer *pv* setulae on basal two-fifths, mid tibia with two strong *p* setae; hind femur with 3–4 strong *av* pre-apicals and a row of longer *pv* setulae on apical third, hind tibia with 2 very small *pd* setae and at middle a rather strong *ad* and two *av* setae.

Length.—5·3–6·2 mm., of wings 4·9–5·9 mm.

Distribution.—BURMA: Rangoon, 23.XII.04–3.I.05 (*E. Brunetti*), ♂ type, 2 ♂ paratypes (in B.M.). INDIA: Calcutta, 26.XI.07 (*Mus. Collector*), 1 ♀ paratype (in Zoological Survey of India, Calcutta). ? MALAYA: Kelantan, Kota Bharu, 17.V.51, pupa on paddy stem (*R. A. Lever*), 1 immature ♂

Among the '*Mydaea*' species of Stein's key *dorsocentralis* comes nearest *bistriata* and *pallens*, the former (which is probably a *Pahangia*) differing from it by the pale base of the abdomen, whilst *pallens* has only the base of the femora browned (and differs besides by the glabrous lower edge of the scutellum).

161. **Dichaetomyia bibax** (Wiedemann).

(Figs. 86*b* and 89*a*)

1830. ! *Anthomyia bibax* Wied., *Aussereur. zweifl. Ins.*, **II**, 431 ♀ Type: China. Mus. Copenhagen.

1915. ! *Mydaea laeviventris* Stein, *Suppl. ent.*, **IV**, 16; 1918, *Ann. Mus. nat. Hungar.*, **XVI**, 152, 170, 183; 1920, *Tijdschr. Ent.*, **LXII**, suppl. 50. Types: Formosa. Deut. Ent. Inst., Mus. Budapest and B.M. (n. syn.).

1927. *Lophomala laeviventris* (Stein), End., *Konowia*, **VI**, 55.

1928. *Dichaetomyia laeviventris* (Stein), Mall., *Ent. Mitt.*, **XVII**, 319; Karl, 1935, *Arb. morph. taxon. Ent.*, **II**, 41.

Fuscous with largely testaceous legs, shoulders, basal antennal segments and margins and underside of scutellum, head and thorax moderately densely dusted brownish-grey. *Head* dusted brownish-grey, parafacialia and, in male, parafrontalia silver-dusted, parafacialia in female with a shifting dark spot at level of second antennal segment; eyes almost bare, in male almost or quite contiguous, with the anterior facets markedly enlarged, interfrontalia fuscous, very narrow

above, linear or obsolete at middle and triangularly dilated to lunula, parafrontalia linear, moderately dilated below, with 3–4 moderately strong inclinate setae on anterior two-fifths, followed by 1–2 small hairs, near ocelli with 2 minute reclinate hairs, ocellars weak or moderately strong, verticals indistinct; frons of female more than a quarter (0·27–0·28) head-width at vertex, considerably dilated with almost straight sides to lunula, where it is almost two-fifths (0·36–0·39) head-width, frontal triangle poorly defined, somewhat shining anteriorly, slightly exceeding middle, interfrontalia less than thrice as wide as parafrontale at middle, somewhat narrowed to extremities, parafrontalia with 1 strong and 2–3 weak inclinate setae, outer part with numerous black proclinate setulae, ocellars and verticals strong; parafacialia about a third, jowls one-and-a-third, width of third antennal segment; the latter largely infuscated, falling short of mouth-margin by about half its own width; arista long-plumose, longest rays almost half as long again as width of third antennal segment. Palpi fuscous-brown. *Thorax* rather densely dusted pale brownish-grey, with a pair of suffused brown-dusted paramedian vittae, which become broader and fainter behind, and with two pairs of outer vittae which are rather broad and appear well defined only in certain directions; *prsc* moderately strong, anterior *ia* rather strong, somewhat anterior to level of *sa*, *pra* almost as strong as second *npl*; anterior mesopleural well developed, postalar declivity with only a few very small hairs, infrasquamal hairs absent, hypopleura with some hairs above hind coxa. *Abdomen* shining, wholly brassy-black, with very fine and thin grey dust, anterior segments with only lateral marginals and without or with weak lateral discals, third with a complete or interrupted row of stronger marginals, fourth with a complete row of marginals and an interrupted row of discals. *Wings* brownish-grey subhyaline with ochraceous veins; dorsal surface without setulae, r_1 reaching or somewhat exceeding level of *r-m*, the latter between middle and three-fifths of discal cell; r_{4+5} moderately curved downward and very slightly sinuous at apex, *m* conspicuously upcurved at tip, *m-m* slightly oblique and somewhat concave outwardly. Calyptrae pale brownish-grey, lower one somewhat sub-opaque, border pale yellowish-grey, fringe pale golden. Halteres pale reddish-yellow. *Legs* wholly pale including tarsi, but excluding coxae, which are strongly infuscated and sometimes femora, the basal part of which may be strongly browned; mid femur with a complete row of somewhat longer (especially on basal part) *pv* hairs, mid tibia with 2 strong *p*

setae; hind femur with a row of *av* setae on apical third, 3–4 of them strong, hind tibia with 2 small *pd* setae, 2 small *av* and 2 moderately strong *ad* setae.

Length.—5·2–7·4 mm., of wings 5·5–8·2 mm.

Distribution.—Mountains of N. INDIA (from Simla to Assam). N. BURMA. S. CHINA. FORMOSA. JAPAN. MALAYA. SUMATRA. JAVA.

Description based on the type of *bibax*, which Dr. S. L. Tuxen has kindly enabled me to examine, and on several paratypes of *laeviventris* from Formosa, obtained in exchange

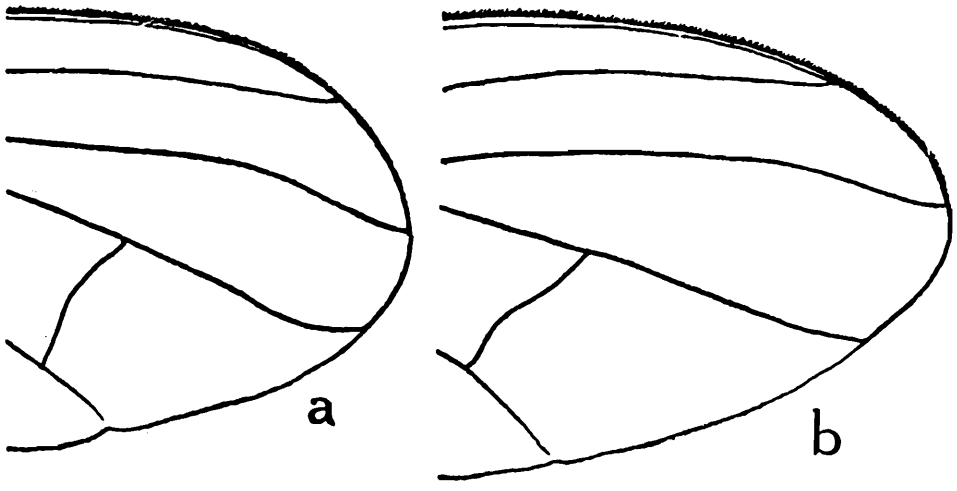


FIG. 89. Wing tip of (*a*) *Dichaetomyia bibax* (Wied.), (*b*) *Dichaetomyia flavipalpis* (Stein).

from Deutsches Entomologisches Institut and the Budapest Museum. In the type and a specimen labelled '*Mydaea laeviventris* St. Type, det. Stein' from Darjeeling, 10.IX.05 (*Brunetti*), the femora are strongly browned on basal half and the first *post dc* is strong. The latter specimen was not mentioned in Stein's original description but only in 1918. A series from Kambaiti (N.E. Burma) also has the femora more or less strongly browned on basal half or so. The present species can at once be recognized by the erect pale cilia on the underside of the scutellum in combination with the dusted upperside of the latter.

162. **Dichaetomyia flavipalpis** Stein.

(Fig. 89*b*)

1915. ! *Mydaea flavipalpis* Stein, *Suppl. ent.*, IV, 17; 1918, *Ann. Mus. nat. Hungar.*, XVI, 184. Types: Formosa. Deut. Ent. Inst., paratype in B.M.

1927. *Lophomala flavipalpis* (Stein), End., *Konowia*, VI, 55.

1935. *Dichaetomyia flavipalpis* (Stein), Karl, *Arb. morph. taxon. Ent.*, II, 41.

Head largely fuscous, abdomen fuscous except for base and apex, otherwise pale ferruginous with broadly infuscated mesonotum. *Head* with pale ferruginous facial ridges and mouth-margin, clypeus and jowls dull brown; eyes almost bare, in male contiguous with anterior facets enlarged, interfrontalia almost obsolete above, obsolete on greatest intermediate part and forming a rather small triangle below, parafrontalia linear, slightly widened in front, with 3–4 inclinate setae and a few setulae on anterior two-fifths and with 2 minute reclinate hairs near anterior ocellus, ocellars not very strong, verticals fine and small; in female a quarter head-width (0·24–0·28) at vertex, slightly dilated with almost straight sides to lunula where it is less than a third (0·29–0·33) head-width, frontal triangle dusted grey, reaching middle of frons, interfrontalia slightly narrowed at extremities, about four times as wide at middle as a parafrontale, the latter with about four inclinate setae, the strongest near lunula and a moderately strong one at middle, ocellars and inner verticals strong, outer verticals moderately strong; parafacialia about a quarter, jowls in male one-and-a-half times, in female equal to, width of third antennal segment, the latter almost or quite reaching mouth-margin, slightly infuscated in female; longest rays of arista almost (in some males fully) as long as width of third antennal segment. Palpi bright yellowish-orange, somewhat compressed and dilated. *Thorax* ferruginous in ground-colour, strongly infuscated in front of suture, behind suture more or less infuscated along median line and on the four vittae, which gradually fade out behind level of second *post dc*, with three densely grey-dusted vittae (along median line and along the *dc*), pleura often with dark suffusions; *prsc* well developed, anterior *ia* rather strong, on or slightly behind a straight line imagined through *sa* and the first *post dc*, *pra* and anterior mesopleural well developed, infrasquamal hairs well developed, postalar declivity and hypopleura above hind coxa with a few pale hairs, upper part of hypopleura almost or quite bare. *Abdomen* piceous- or fuscous-black, moderately shining and thinly dusted brown-grey with the apex of the fourth segment and the whole of the first, except for a narrow brown hind margin, pale ferruginous, second segment as a rule more or less broadly pale at base; setae as in *bibax*. *Wings* yellowish-grey subhyaline with testaceous and light brown veins, dorsal surface without any setulae; r_1 reaching or slightly exceeding level of *r-m*, the latter well beyond middle of discal cell; r_{4+5}

rather strongly curved downward and markedly sinuous at apex, *m* very slightly and gradually upcurved at tip, *m-m* moderately oblique and outwardly concave. Calyptrae brownish-grey subopaque with brownish border and golden fringe. Halteres pale reddish-yellow. *Legs* as in *bibax*, but the coxae wholly pale and the tarsi browned, more strongly so towards apex, hind tibia with only 1 *ad* seta.

Length.—4·9–6·5 mm., of wings 5·3–6·6 mm.

Distribution.—N.E. INDIA (Darjeeling district; Assam). N.E. BURMA. MALAYA (Perak; Pahang). FORMOSA.

Prof. W Hennig was good enough to inform me that the hairs on the underside of the scutellum are present in Stein's typical series, as they are in a paratype obtained in exchange from Deutsches Entomologisches Institut. The identification is thus confirmed.

163. **Dichaetomyia indica** (Walker).

1856. ! *Anthomyia indica* Walk., *Dipt. Saunders*, 352 ♀ . Type: E. Indies. B.M.

1901. *Spilogaster indica* (Walk.), Stein, *Zeit. Hymen. Dipt.*, I, 198.

Pale ferruginous with fuscous head, disc of mesonotum and larger apical half of abdomen, pleurae with large suffusions. *Head* moderately densely dusted brownish-grey, facial ridges and anterior part of jowls dull reddish; eyes almost bare, in male contiguous with anterior facets markedly enlarged, interfrontalia almost obsolete above, obsolete at middle and triangular on lower third, parafrontalia linear, slightly widened on lower third where 3–4 inclinate setae are present, followed by 1–2 inclinate and, near ocelli, 2 minute reclinate hairs, ocellars rather weak, verticals indistinct; frons of female more than a quarter (0·26–0·29) head-width at vertex, evenly dilated to lunula where it is over a third (0·34–0·38) head-width, frontal triangle ill-defined, undusted, slightly shining and indefinitely produced beyond middle, interfrontalia markedly narrowed in front and behind, 3–4 times as wide at middle as a parafrontale, the latter with 3 strong inclinate setae and a few setulae on anterior half and with some proclinate black setulae on outer part, ocellars and inner verticals strong, outer verticals moderately strong; parafacialia a quarter or third width of third antennal segment, the latter falling short of mouth-margin by almost half its own width; longest hairs of arista not or slightly longer

than width of third antennal segment. Palpi dull brown. *Thorax* rather densely dusted brownish-grey on disc, less densely so on scutellum, with four narrow fuscous vittae, the paramedian ones broadly separated by pale dust, the outer ones more broadly interrupted at suture, the *post* area between the vittae sometimes not or hardly infuscated, in addition an undusted (dull ferruginous) dorsolateral vitta through the *sa* and in female often a narrow undusted streak through the *ia*; *prsc* and *pra* rather weak but distinct, anterior *ia* moderately strong, anterior to level of *sa*; anterior mesopleural well developed, postalar declivity bare. *Abdomen* thinly dusted brownish-grey, the first two segments testaceous with a piceous median vitta, first with a well-defined narrow, second with a suffused broad, piceous hind margin; setae as in *laeviventris*. *Wings* yellowish-smoky, subhyaline, with brown to testaceous veins, which are bare on upperside; r_1 reaching or slightly exceeding level of *r-m*, the latter beyond middle of discal cell; r_{4+5} considerably curved backward and somewhat sinuous at apex, *m* markedly upcurved at tip, *m-m* rather strongly oblique, especially in male and outwardly concave in more than posterior half. Calyptrae brownish-ochraceous, lower one subopaque with pale testaceous border and pale golden fringe. Halteres pale reddish-yellow. *Legs* wholly pale including coxae, only the distal tarsal segments more or less infuscated; fore tibia with a *p* seta at middle; mid femur with a complete row of rather long *pv* hairs and on apical half a row of *p* hairs, mid tibia with 2 strong *p* setae; hind femur with a row of fine moderately long *av* and *pv* hairs, 3–4 *av* setae near apex rather strong, hind tibia with very small or quite indistinct *pd* setae, with 2 small *av* and with an *ad* seta near middle.

Length.—5·6–7·7 mm., of wings 6·5–7·7 mm.

Distribution.—ASSAM (Mishmi Hills). N.E. BURMA (Kambaiti). E. INDIES.

Closely related and similar to *fulvitarsis* Mall., but larger, the first *prsc dc* stronger, and the abdomen with a well-defined black hind marginal band on first segment. The species was omitted from Stein's key where it will be traced to *biplaga* (Walk.), a species which belongs to the first group in the above key, as it has numerous black setulae along the lower edge of the scutellum. The piceous hind margin of the first tergite, the entirely bare hypopleura and propleural depression and the presence of a *p* seta on the fore tibia are distinctive features of this species.

164. **Dichaetomyia acrostichalis** sp. n.

♂ ♀: Pale ferruginous with fuscous head and piceous dorsal and lateral surfaces of intermediate tergites, apical margin of first and suffused basal part (up to a third or half) of fourth tergite and tarsi; antenna of male light brown, of female dark brown. *Head* moderately densely dusted greyish-brown, parafacialia and parafrontalia with only slightly brighter pollinosity; eyes virtually bare, in male closely contiguous with slightly enlarged anterior inner facets, interfrontalia obsolete except for a small triangle on anterior fourth of frons, parafrontalia perfectly linear in posterior three-fifths, slightly widened anteriorly, where 3–4 inclinate setae are present, the last of which are more or less hair-like, ocellars and verticals fine but moderately long and very distinct; frons of female at vertex more than a quarter (0·26–0·28) head-width, gradually dilated with straight sides to lunula where it is about one-third (0·32–0·35) head-width, frontal triangle elongate, fuscous and somewhat shining but not well defined, tapering out towards lunula, interfrontalia conspicuously narrowed to extremities, thrice as wide at middle as a parafrontale, the latter with 2–3 strong and, between and behind them, 1–2 small inclinate setae and, to their outer side, an irregular row of a few proclinate setulae, ocellars and inner verticals strong, outer verticals moderately strong; parafacialia linear in profile, jowls as wide as third antennal segment, the latter reaching mouth-margin; arista plumose, rays not becoming markedly shorter to apical fourth or fifth, longest rays hardly longer than width of third antennal segment. *Thorax* glossy, some slight yellowish-white dust visible only in posterior view on the *dc* strip and the shoulder region; *prst acr* in about 6 irregular rows, the outer one towards suture containing 3–4 much longer hairs, which may almost be termed weak setae, and which are separated from the *dc* by a rather broad virtually bare strip, *prsc* moderately strong, another pair of similar setae not much in front of them, anterior *ia* slightly in front of level of *sa*, *pra* conspicuous, anterior mesopleural well developed, postalar declivity with some small pale hairs on lower part, infra-squamal hairs present, small, hypopleura with a few odd hairs below spiracle and above coxa. *Abdomen* thinly dusted brownish, in posterior view shining, anterior three segments with lateral discals and marginals, third with more or less well-developed marginals on the whole width, fourth with a row of moderately strong discals and marginals. *Wings*

subhyaline, in female slightly, in male strongly, yellowish-smoky, veins brown, bare on dorsal surface; r_1 almost or quite reaching level of *r-m*, which lies towards three-fifths of discal cell, r_{4+5} somewhat curved backward, markedly sinuous at apex, *m* markedly upcurved at tip, less so in type, *m-m* rather upright, markedly concave outwardly at middle. Calyptrae of male brown, of female brownish, with more strongly browned border and fringe. Halteres pale reddish-yellow. *Legs:* Fore tibia with a *p* seta; mid femur with a complete row of rather fine *pv* setae and on lower apical part of *p* surface with a row of 4–5 similar setae, mid tibia with 2 strong *p* setae; hind femur with a row of small *av* setae, the 2–4 distal ones being much stronger and longer, 1–2 weak *pv* setae near middle, and some stronger *pv* setulae at apex, hind tibia with a small *pd*, 1 rather strong *ad* and (1–)2 *av* setae.

Length.—5·3–6·3 mm., of wings 6·3–6·6 mm.

Distribution.—CEYLON: Pitrutalagala, C.P., 2,000–2,460 m., 19.IX.53 (*F Keiser*), ♂ type, 3 ♀ paratypes (type and paratype in Mus. Basle, paratypes in B.M.).

165. **Dichaetomyia aurantiaca** sp. n.

♀: Pale ferruginous with fuscous head, fourth abdominal segment mostly piceous-brown, also third on median and posterior parts; third antennal segment and palpi dull brown. *Head* rather thinly dusted brownish-grey, facial ridges and clypeus translucent dull reddish, eyes practically bare, separated at vertex by almost three-tenths head-width, frons moderately dilated with somewhat concave sides to lunula where it is almost two-fifths head-width; frontal triangle poorly defined, somewhat dusted grey, very narrow and indistinctly reaching lunula, interfrontalia gradually narrowed to vertex, somewhat narrowed at lunula, four times as wide at middle as a parafrontale, the latter with 2 strong and 1–2 very weak inclinate setae on anterior half, ocellars rather strong, verticals strong; parafacialia about a quarter, jowls equal to, width of third antennal segment, the latter reaching mouth-margin; rays of arista widely spaced, the dorsal ones of almost even length, three-quarters length of diameter of third antennal segment, proximal antennal segments somewhat browned. *Thorax* almost undusted, in posterior view a short narrow vitta to the outer side of the *prst dc* and the shoulder area dusted pale golden; *prsc* well developed, anterior *ia* moderately strong, anterior to level of *sa*, *pra* conspicuous but short; anterior mesopleural well developed,

postalar declivity with some very fine short pale hairs on lower part. *Abdomen* thinly and evenly dusted brownish, the dust more noticeable on the darkened areas; anterior segments with the hind margins narrowly and inconspicuously browned, third segment with the hind margin and a rather broad suffused median part piceous-brown, fourth wholly so except for the outer basal part, which remains suffusedly ferruginous; anterior segments with only lateral marginals and discals, third with lateral discals and a well-developed row of marginals, fourth with a conspicuous row of discals and marginals, each consisting of only 2–3 pairs of setae. *Wings* smoky subhyaline with brown veins with pale testaceous base; veins bare on dorsal surface, r_1 slightly exceeding level of *r-m*, the latter slightly beyond middle of discal cell, r_{4+5} evenly curved downwards, but apical part virtually straight, *m* very slightly upcurved at apex, *m-m* rather straight and almost upright. Calyptrae brownish-grey with greyish-brown border and golden fringe. Halteres light reddish-brown. *Legs* wholly pale ferruginous, including coxae and trochanters, only the tarsi darkened; fore tibia with a *p* seta; mid femur with a complete row of longer *pv* hairs, mid tibia with two strong *p* setae; hind femur with 1–2 strong *av* setae at apical third, hind tibia without distinct *pd* setae and with 2 *av* and 1 *ad* at middle.

Length.—5·4 mm., of wings 6·0 mm.

Distribution.—S. INDIA: Kodaikanal, 7,000 ft., 23.III.36 (*B.M.-C.M Exp. to S. India, 1936*), ♀ type (in B.M.).

D. aurantiaca will be traced to *Mydaea diluta* in Stein's key, a New Guinean species with a rather long *pra*, browned tibiae, apparently only 1 *av* on the hind tibia, and long-plumose ('lang gefiedert') arista.

166. **Dichaetomyia brunneofemorata** sp. n.

♀: Fuscous, with pale ferruginous antennae, shoulders, scutellum, trochanters, knees, tibiae and tarsi, thorax ferruginous with infuscated mesonotum and more or less infuscated pleurae. *Head* with rather dense silver-grey dust; small dark shifting spot at level of second antennal segment; eyes almost bare, separated at vertex by more than a fifth (0·22–0·23) head-width, frons evenly broadened with slightly concave sides to lunula, where it is almost a third (0·31) head-width, frontal triangle ill-defined, a slightly shining tapering median strip reaching lunula, interfrontalia somewhat narrowed to extremities, 2½ times as wide at middle as a parafrontale, the latter with 1 strong and 2–3 weak and hair-like inclinate

setae on anterior half; ocellars and inner verticals strong, outer verticals moderately strong; parafacialia about a quarter, jowls equal to, width of third antennal segment; the latter reaching mouth-margin, pale ferruginous, slightly infuscated except at base; rays of arista rather dense, somewhat curved at tip, the longest fully half as long again as width of third antennal segment. *Thorax* with moderately dense whitish-grey dust and four, behind suture six, undusted vittae; *prsc* well developed, anterior *prst dc* small, anterior *ia* rather short, slightly in front of level of *sa*, *pra* conspicuous but short; anterior mesopleural well developed, postalar declivity with a few fine hairs on lower part, infrasquamal hairs minute and scarce. *Abdomen* thinly and evenly dusted grey, wholly piceous-brown, setae as in *aurantiaca*. *Wings* subhyaline, yellowish, more conspicuously so at base, with ochraceous veins, these bare on dorsal surface; r_1 reaching or somewhat exceeding level of *r-m*, which lies beyond middle of discal cell; r_{4+5} moderately curved backward and very slightly sinuous at apex, *m* conspicuously upcurved, *m-m* straight and rather upright. Calyptrae subopaque, pale ochraceous with concolorous border and golden fringe. Halteres dull reddish-grey. *Legs* with piceous coxae and femora, otherwise pale, though the tarsi are slightly browned; fore tibia with a *p* seta; mid femur with a long *av* at basal quarter and 2–3 long *pv* on basal half, mid tibia with 2 *p* setae; hind femur with a complete row of rather strong *av* setae and at basal third a strong *pv*, hind tibia with a small *pd*, a strong *ad* and 2 small *av*.

Length.—6·4 mm., of wings 6·3 mm.

Distribution.—MALAYA: Lubok Tamang, Pahang, 3,500 ft., 8.VI.23 (*H. M. Pendlebury*), ♀ type; Cameron Highlands, Pahang, 4,000–4,500 ft., 15.VI.35 (*H. M. Pendlebury*), 1 ♀ paratype (in B.M.).

'*Mydaea*' *nitidiventris* Stein, to which Stein's key will lead, differs from the present species by dark shoulders, dark scutellum and 'black' halteres. *Dichaetomyia atratula* Malloch from the Philippines is even more similar, but its tarsi are 'yellow', the anterior *prst dc* 'minute' (in the present species about half as long as the posterior one), and the hind femur has no *pv* seta.

167. **Dichaetomyia fusciventris** sp. n.

♀: Very closely related and similar to *brunneofemorata*, the thorax wholly fuscous apart from the pale ferruginous

shoulders, with more conspicuous dust, the scutellum piceous-brown on base and disc with a rather broad pale ferruginous margin; abdomen shining fuscous-black; tarsi pale testaceous with only the apical 1–2 segments slightly browned. Other characters as described for *brunneofemorata* with the following deviations: Vertex hardly more than a fifth head-width, frons slightly more dilated, a third head-width at lunula. Infrasquamal hairs absent, r_{4+5} very slightly curved backward, mid femur with 3–4 short *av* setae on basal two-fifths, a long *pv* at basal fourth and 2–3 rather long ones from there to shortly beyond middle; the 7–8 *av* setae of the hind femur of subequal length, hardly longer than width of femur, a small *pv* near basal third and another near middle.

Length.—5·9 mm., of wings 5·4 mm.

Distribution.—MALAYA: Kedah Peak, 3,000 ft., 18.III.28 (*H. M. Pendlebury*), ♀ type (in B.M.).

The short anterior *prst dc* and the dark halteres are characters common to the present species, *brunneofemorata*, *nitidiventris* (Stein) and *atratula* Mall. The latter has the scutellum entirely honey-yellow, and *nitidiventris* has dark shoulders.

168*a*. **Dichaetomyia prolixa bioculata** ssp. n.

(Fig. 90)

♂ ♀: Pale ferruginous with fuscous head, piceous disc of mesonotum and a piceous-black roundish or ovate spot on each side of fourth tergite (on dorsolateral surface), preceding tergites often more or less broadly piceous on median line, more broadly so on posterior part, tarsi strongly, hind tibiae sometimes distinctly, browned, antennae pale testaceous, palpi fuscous. *Head* dusted grey, parafacialia and anterior part of parafrontalia dusted silver-white; eyes almost bare, in male closely contiguous, interfrontalia obsolete except in anterior fifth, parafrontalia perfectly linear, except in anterior third where they become somewhat broader, and where 3 inclinate setae (the third very small) and 1–2 hairs are present, with 1 reclinate hair towards anterior ocellus, ocellars rather weak, verticals indistinct; vertex in female less than a quarter head-width (0·22–0·24), frons moderately dilated with straight sides to lunula, where it is three-tenths head-width, frontal triangle poorly defined, a somewhat shining streak extending to anterior fourth, interfrontalia considerably narrowed to extremities, thrice as wide at middle as a parafrontale, the latter with 1 strong and 3–4 weak inclinate setae and, on outer part, with an irregular row of proclinate black setulae, ocellars

and verticals strong; parafacialia about a quarter, jowls one-and-a-half times (♂), or equal to (♀), width of third antennal segment; the latter almost reaching mouth-margin; arista densely long-plumose, longest hairs almost twice as long as width of third antennal segment. *Thorax* shining and with very thin and inconspicuous brownish-grey dust, without any distinct vittae, the piceous spot extending over whole length of mesonotum and laterally limited by an almost straight line through the *ph* and *ia*; pleurae wholly pale including infra-alar bulla and the adjacent triangular sclerite; *prsc* well developed, first *prsc dc* half as long as second, anterior *ia* absent, *pra* and anterior mesopleural very distinct, post-alar declivity with a few pale hairs, infrasquamal hairs present, hypopleura with a few hairs above hind coxa. *Abdomen* shining and with very thin dust like the thorax, anterior three segments with only lateral marginals and discals, third sometimes with weak marginals completing a marginal row, fourth with an interrupted discal and a complete marginal row. *Wings* subhyaline, somewhat yellowish, with pale testaceous veins; dorsal surface without setulae, r_1 reaching or distinctly exceeding level of *r-m*, the latter at three-fifths of discal cell; r_{4+5} somewhat curved backward and

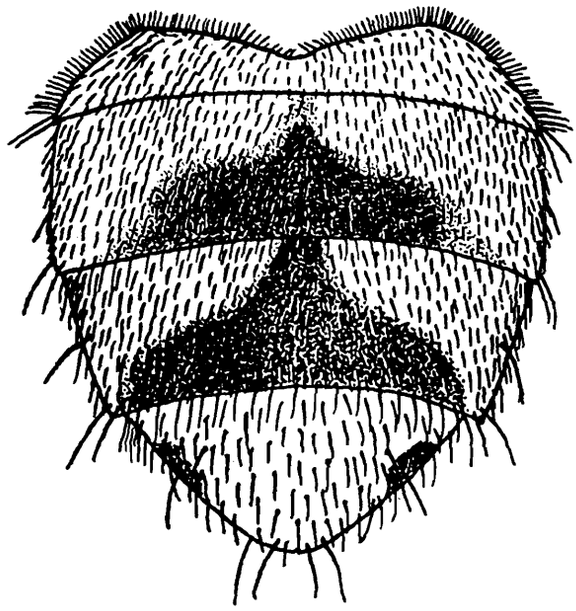


FIG. 90. *Dichaetomyia prolixa bioculata* ssp. n., female abdomen.

usually distinctly sinuous, *m* virtually straight or slightly upcurved at apex, *m-m* as a rule markedly sinuous but not very oblique, calyptrae pale yellowish-grey with concolorous border and pale golden fringe. Halteres dull reddish-yellow. *Legs:* Mid femur with a *pv* seta at base, otherwise without

outstanding *av* or *pv* setae, mid tibia with 2 *p* setae; hind femur with 3–4 weak *pv* setae towards middle and 5–6 *av* on less than apical half, hind tibia with or without a very small *pd* seta, and with a strong *ad* and a moderately strong *av*.

Length.—4·8–5·7 mm., of wings 5·2–5·8 mm.

Distribution.—MALAYA: Larut Hill, 3,700 ft., 15.II.32, at light (*H. M. Pendlebury*), ♀ type (in B.M.); Bukit-Kutu, Selangor, 3,500 ft., 20.IV.26 (*H. M. Pendlebury*), 1 ♀ paratype; Kedah Peak, 3,000–3,500 ft., 15.III.28 (*H. M. Pendlebury*), 1 ♀ paratype; Kedah, nr. Jitra, catchment area, 4.IV.28 (*H. M. Pendlebury*), 1 ♀ paratype; Pulau Jarak W Coast, 26.IV.32, at light (*E. Seimund*), 1 ♀ paratype, 9.IV.32, 1 ♀ paratype (paratypes in B.M. and U.S. National Mus.). SIAM: Patalung, 3.V.24 (*F H. N Evans*), 1 ♂ paratype (somewhat *Anthrenus*-eaten, in B.M.); Bulsit Besar, 2,500 ft., 28.VIII.01 (*H. C. Robinson* and *N. Annandale*), 2 ♂ paratypes (in B.M.).

In Stein's key this form will be traced to *prolixa* Walk., from the East Indies. Walker's type differs from the form of the Malayan peninsula only by the presence of the anterior *ia*, the smaller width of the mesonotal spot, which hardly exceeds the *dc* laterally and the intermediate tergites, which, instead of a median spot, show each a complete though somewhat suffused transverse piceous band.

168*b*. **Dichaetomyia prolixa pallidorsis** ssp. n.

♂ ♀: Entirely fitting the preceding description apart from the uniformly pale-ferruginous mesonotum. The intermediate tergites are wholly pale; what dark colouration there is in the typical series, is obviously due to post-mortem rot. About one-half of the specimens, including the one from Jambu, have a weak anterior *post dc*.

Length.—5·2–6·3. mm., of wings 5·2–5·8 mm.

Distribution.—CEYLON: Suduganga, 29.V.19, on window (*R. Senior White*), ♀ type, 12.VI.22, on window, 1 ♀ paratype, 31.III.19, on scrub, 2 ♀ paratypes; Peradeniya, V.18 (*N K. J.*), 1 ♀ paratype. (Type and paratypes in coll. Senior White in B.M.); Peradeniya, 30.IV.91 (*Yerbury*), 1 ♂ paratype (in B.M.); Peradeniya, 1918 (*N K. Jardine*), 1 ♀ paratype. SIAM: Jambu 7.VI.01 (*H. C. Robinson* and *N. Annandale*), 1 ♀ without head.

Very similar to *D. rufa* (Stein) and *decipiens* (Stein) (1918, *Ann. Mus. n. Hungar.*, XVI, 184; 1919, *Nova Guinea*, XIII (*Zool.*), 204; omitted from Séguy, 1937, *Gen. Ins. fasc.*, 205), which differ mainly by the absence of the paired spot of the fourth abdominal segment.

169. **Dichaetomyia pallens** (Stein).

1918. ! *Mydaea pallens* Stein, *Ann. Mus. n. Hungar.*, **XVI**, 170, 181, ♂ ♀ . Type: Penang. B.M.

Normally fuscous-brown with pale ferruginous shoulders, base of abdomen and legs, but base of femora more or less broadly piceous-brown, coxae strongly browned, pleurae somewhat ferruginous translucent, especially along the sutures, antennae pale yellowish-orange, third segment slightly browned, except at base, palpi dull reddish-brown; dorsum rather densely dusted pale grey. *Head* with rather dense pale brownish-grey dust, parafacialia and parafrontalia dusted silver-white in female with a small but conspicuous dark spot at level of second antennal segment; eyes practically bare, in male contiguous or practically so, interfrontalia obsolete or obsolescent at middle, just visible in front of ocelli and forming a rather broad short triangle at lunula, parafrontalia very narrow to linear at middle, somewhat dilated to lunula, with 3–4 inclinate setae on less than anterior half and a minute reclinate setula near anterior ocellus, ocellars weak, verticals indistinct; vertex of female just over a fifth head-width, frons evenly broadened with almost straight sides to lunula where it is three-tenths head-width, frontal triangle somewhat shining, poorly defined and drawn out into a narrow point which exceeds middle of frons, interfrontalia dull reddish-fuscous, somewhat narrowed behind, hardly narrowed in front, thrice as wide at middle as a parafrontale, the latter on anterior half with 1 strong and 3–4 weak inclinate setae and on outer part with an irregular row of proclinate black setulae, ocellars and verticals strong; parafacialia hardly a quarter (♂) or third (♀), jowls slightly narrower than, width of third antennal segment, the latter almost reaching mouth-margin; longest rays of arista about twice as long as width of third antennal segment. *Thorax* including scutellum rather densely dusted pale grey, with 4 (6) dark vittae, which in male are dusted brown and very narrow; *prsc* well developed, anterior *prst dc* and second *post dc* small, first *post dc* very small, anterior *ia* small, about level with second *post dc* and somewhat anterior to level of *sa*, *pra* small; anterior mesopleural well developed, postalar declivity almost bare, infrasquamal hairs absent, hypopleura bare above but with some small hairs above hind coxa. *Abdomen* of female glossy fuscous with thin even dust, appearing somewhat brassy, of male densely dusted grey with the dust more brownish on disc and with a very narrow fuscous median vitta; setae of male as in *aurantiaca*, in female third segment

with only lateral marginals and discals, fourth in both sexes with the discal row broadly interrupted on disc. *Wings* subhyaline, somewhat yellowish, veins light brown, bare on dorsal surface, r_1 slightly exceeding level of *r-m*, the latter in male at three-fifths, in female beyond middle of discal cell; r_{4+5} somewhat curved backward and slightly sinuous at apex, fourth distinctly somewhat upcurved; *m-m* rather straight and slightly oblique. Calyptrae yellowish-grey with pale greyish-yellow border and pale golden fringe. Halteres pale reddish-yellow. *Legs* with pale tarsi and normally the greater part of each femur piceous-brown; mid tibia with 2 strong *p* setae; hind femur with a complete row of *av* setae, which become somewhat stronger on apical half, and with some fine *pv* setae on basal half, hind tibia with 1–2 inconspicuous *pd* setae and a rather small but conspicuous *ad* at middle and 1–2 small *av* near middle.

Length.—4·7–7·3 mm., of wings 5·1–7·2 mm.

Distribution.—CEYLON. INDIA (Tanjore; Bombay; Bihar; Bengal). MALAYA (Penang; Pahang; Kedah).

Stein mentions 2 ♂ with identical data collected by Brunetti at Penang. The specimen in the B.M. is herewith selected as the type. The paratype has presumably been retained by Stein and should be in the Berlin Museum. Indian specimens are less infuscated and the only three *D. pallens* from Bengal are almost evenly dull ferruginous with the disc of the mesonotum somewhat darker and the abdomen more or less infuscated. Unaware of the fact that Stein's *Mydaea pallens* is a *Dichaetomyia*, Curran (1928) described a *D. pallens* from the Congo. This was subsequently placed by him in sbg. *Panaga* and has proved to be a synonym of *D. fumaria* (Stein).

170. **Dichaetomyia manca** sp. n.

(Fig. 91)

♀: Pale ferruginous with fuscous head and palpi but reddish-yellow antennae, brown tarsi and a broadly triangular suffusion on each of second and third tergites extending almost from hind margin to near fore margin. *Head* rather densely dusted pale grey; eyes practically bare, separated at vertex by a quarter head-width, frons evenly dilated with straight sides to lunula, where it is three-tenths head-width; frontal triangle very poorly defined, slightly shining, hardly exceeding middle, interfrontalia somewhat narrowed at extremities, thrice as wide at middle as a parafrontale, the latter with 2

strong and 3 small inclinate setae and to their outer side with a row of proclinate black setulae, ocellars and verticals strong; parafacialia a third, jowls three-quarters, width of third antennal segment, the latter reaching mouth-margin; arista long-plumose, rays not very numerous, becoming moderately

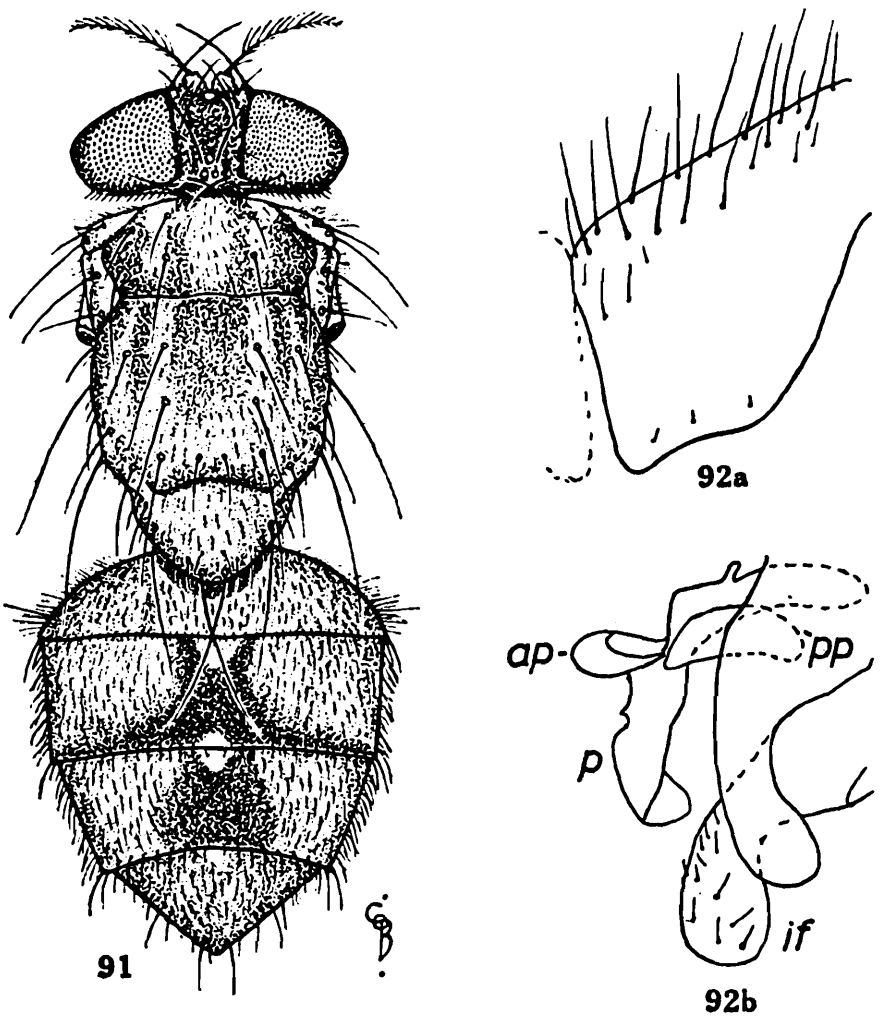


FIG. 91. *Dichaetomyia manca* sp. n., ♀, wings and legs omitted.

FIG. 92. *Dichaetomyia heterocnemis* sp. n., male genitalia. *a*, superior forceps; *b*, inferior forceps and penis. *ap*, anterior paramere; *if*, inferior forceps; *p*, penis; *pp*, posterior paramere.

quickly shorter from middle onwards, longest rays a third longer than width of third antennal segment. *Thorax* dusted brownish-white on a median vitta and a fainter and narrower vitta over the *prst dc*, which is divided at suture and narrowly continued over the *post dc* and *ia*, shoulder area with similar denser dust; *prsc*, anterior *ia* and *pra* not very strong, 2+3 *dc*, the anterior *prst* one half as long as the posterior one, the first *post* one slightly more widely distant from suture than from second (but no vestige of a fourth *dc* present); anterior mesopleural small but distinct, postalar declivity

and hypopleura with a few small pale hairs below, infra-squamal hairs well developed, dark. *Abdomen* shining, evenly very thinly dusted, appearing finely shagreened, anterior segments without distinct marginals, third and fourth with distinct lateral discals and lateral marginals, fourth also with distinct median marginals. *Wings* greyish subhyaline with a yellowish tinge, veins light brown, bare on dorsal surface; r_1 slightly exceeding level of *r-m*, the latter beyond middle of discal cell, r_{4+5} and *m* very slightly converging at apex, r_{4+5} gently and slightly curved back and sinuous, *m* very slightly upcurved at tip; *m-m* almost upright, somewhat concave behind middle. Calyptrae ochraceous subopaque, with concolorous border and pale-golden fringe. Halteres pale reddish-yellow. *Legs* wholly pale except for the brown tarsi; fore tibia without a submedian *p* seta (mid legs of type lost); hind femur with a rather weak *pv* seta near basal third and 2–3 *av* on apical third; hind tibia with a rather small *ad* and a small *av* seta slightly beyond middle.

Length.—6·0 mm., of wings 5·0 mm.

Distribution.—CEYLON: Kottawa, 19.IV.92 (*Yerbury*), ♀ type (in B.M.).

171. **Dichaetomyia heterocnemis** sp. n.

(Fig. 92)

♂ ♀: Pale ferruginous with fuscous head and piceous abdomen, apart from greater basal half of first and apical half of fourth segment, mesonotum with a broad dark brown median suffusion; antennae pale testaceous with the third segment somewhat browned, tarsi fuscous, hind tibiae dark brown, anterior tibiae hardly browned. *Head* dusted brownish-grey with silver-grey parafrontalia and parafacialia, the latter with a very small shifting dark spot at level of antennal base; eyes almost bare, vertex slightly over a quarter head-width, frons evenly dilated to lunula where it is almost a third head-width, frontal triangle ill-defined, extended to lunula by a subshining slight median callosity, interfrontalia somewhat narrowed to extremities, 5–6 times as wide at middle as a parafrontale, anterior two-thirds of the latter with a strong, a rather weak and 2–3 almost hair-like inclinate setae and to their outer side with only 1–2 proclinate black hairs; ocellars and verticals strong; parafacialia almost linear below, jowls as wide as, third antennal segment, the latter almost reaching mouth-margin; longest hairs of arista almost twice as long as width of third antennal segment. *Thorax* glossy, appearing undusted

in dorsal view except for a small densely dusted spot behind neck (divided into two in type), and a little pale dust at shoulders, etc., the dark brown median suffusion extending through the *dc* pores and along the line of the normal paramedian vittae, these two vittae coalescing on each side and, to a lesser extent, on median line; all *dc* strong, *prsc*, anterior *ia* and *pra* rather strong, *pra* not much shorter than second *npl*, anterior *ia* on an imaginary straight line through the first *post dc* and the *sa*; anterior mesopleural present, postalar declivity almost bare, infrasquamal hairs present, hypopleura bare except for a few pale hairs above hind coxa. *Abdomen* glossy with very thin brown-grey dust, setae as in *pallens*. *Wings* subhyaline, markedly yellowish, veins testaceous, base of r_{4+5} with 1–3 minute setulae in dorsal surface; r_1 slightly exceeding (in male reaching) level of *r-m*, the latter well beyond middle of discal cell; r_{4+5} moderately curved backward at apex, in female not, in male distinctly, sinuous, *m* slightly but distinctly upcurved at tip; *m-m* somewhat sinuous and slightly oblique. Calyptrae pale ochraceous-grey with pale ochraceous border and golden fringe. Halteres pale reddish-yellow. *Legs:* Mid femur with 2–3 *pv* setae on basal half, in male also with a row of fine *av* setulae on basal half, mid tibia with 2 strong *p* setae; hind femur with a few weak *av* setae on basal half, 3–5 stronger ones on apical half and 3 *pv* setae near middle, hind tibia without a distinct *pd* seta and with a strong *ad* and 2 weak *av* at middle.

Length.—6·5 mm., of wings 6·4–6·8 mm.

Distribution.—MALAYA: Bukit Kutu, Selangor, 3,500 ft., 18.IV.26 (*H. M Pendlebury*), ♀ type; Cameron Highlands, Pahang, 5,000 ft., 18.VI.35 (*H. M. Pendlebury*), 1 ♂ paratype, teneral and without head (types in B.M.).

If the setulae at the base of r_{4+5} are considered to be abnormal the species will be traced near *varicauda*, the brown hind tibia and almost undusted mesonotum show, however, that it is a distinct species. In Stein's key *heterocnemis* will be traced to *leucoceros* Walk. or *incerta* Stein, but the former has *av* setae on apical part of fore femora, a banded abdomen, and a pair of broad and widely separated piceous thoracic vittae; it is also larger and more slender. Stein's *Spilogaster incerta* appears to be very similar in colouration to *heterocnemis*, but *m* is said to be almost straight at tip, and in the description of a doubtful third specimen r_{4+5} and *m* are even stated to diverge slightly at apex; it is probable, therefore, that *incerta* is not a *Dichaetomyia*.

A small female from Bukit Kutu (15.IV.26), 5·3 mm. long, wings 5·5 mm., has the tip of the abdomen only very narrowly

pale, the base of the second tergite narrowly pale, somewhat more broadly so laterally, and the hind margin of the first tergite only narrowly piceous-brown. In this specimen the mid femora have 2 small *a* pre-apicals. Nevertheless, there can be little doubt that it belongs to *heterocnemis*. A male from the Cameron Highlands, 4,500–5,000 ft., 17.VI.35 (*H. M. Pendlebury*), has the same characters but the fourth tergite wholly dark.

172. **Dichaetomyia latitarsis** (Stein).

(Fig. 93)

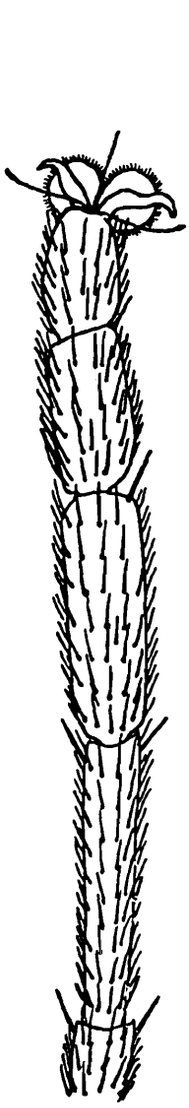
1909. *Mydaea latitarsis* Stein, *Tijdschr. Ent.*, **LII**, 232 ♀; 1918, *Ann. Mus. nat. Hungar.*, **XVI**, 184; 1920, *Tijdschr. Ent.*, **LXII**, suppl., 50, 69. Type: Poentjak nr. Buitenzorg. Mus. Amsterdam.

1925. *Dichaetomyia latitarsis* (Stein), Mall., *Philipp. J. Sci.*, **XXVI**, 324, 331; 1928, *Ent. Mitt.*, **XVII**, 322.

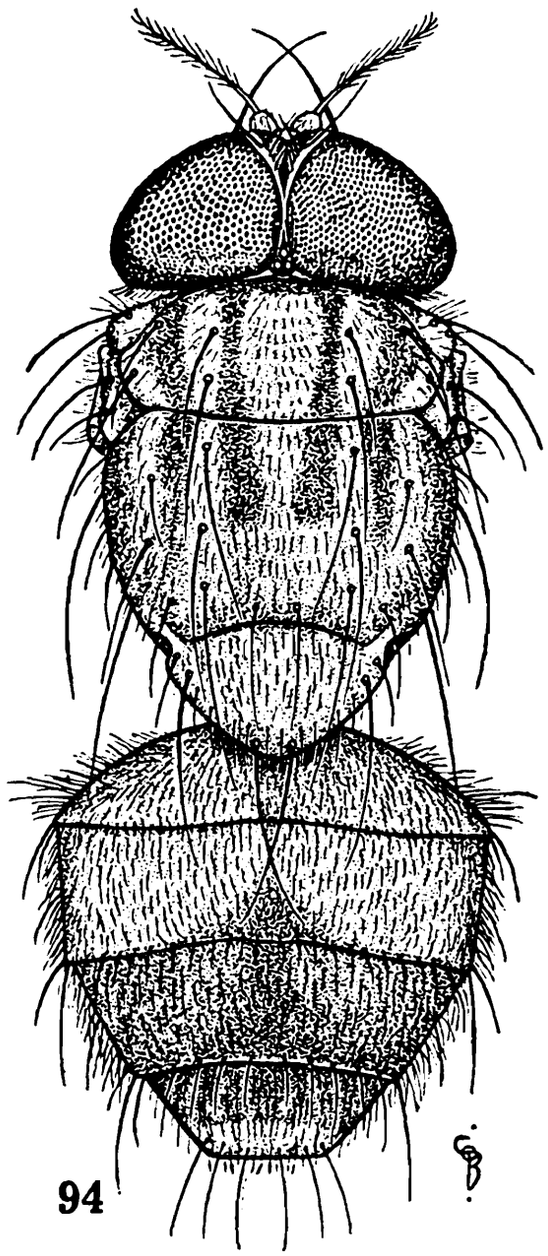
1927. *Lophomala latitarsis* (Stein), End., *Konowia*, **VI**, 55.

Ferruginous with head largely fuscous, mesonotum with three fuscous vittae, which tend to coalesce into a large fuscous discal spot, the outer vittae narrow, on the *dc* line, the median one moderately broad, in posterior view the anterior half or more of the dark vitta is overlaid with dense silver-white dust; abdomen with a large piceous spot which occupies all (or practically all) of third tergite, all of fourth tergite, except a ferruginous hind margin, at least median line and hind margin (but sometimes almost the whole) of second segment, and which does not encroach upon first segment. *Head* thinly dusted grey below and behind, densely dusted silver-white on parafacialia and parafrontalia; facial ridges and antennae pale orange, mouth-margin pale testaceous, jowl dull ferruginous; eyes virtually bare, in male contiguous, interfrontalia obsolete, except for a small triangle above lunula, parafrontalia linear, moderately widened anteriorly, where 5–6 inclinate setae are present, and with a tiny hair towards level of anterior ocellus, ocellars rather strong, verticals indistinct; frons of female almost a quarter (0·22–0·24) head-width, evenly dilated with straight sides to lunula where it is more than a third (0·34–0·35) head-width, frontal triangle fuscous-black, somewhat shining, not reaching middle, interfrontalia dull brown-red, almost parallel-sided, less than thrice as wide at middle as a parafrontale, the latter with 1 strong and 4 small and moderately small inclinate setae and on outer part some very small black hairs, ocellars very strong, verticals strong; lower part of parafacialia about

one-third, jowls nearly twice, width of third antennal segment; the latter falling short of mouth-margin by half to fully its own width, in female moderately infuscated from tip to almost insertion of arista, rays of the latter numerous and of rather even length, the longest twice as long as width of third antennal segment. *Thorax* moderately shining except on the more densely dusted parts; anterior *prst dc* and anterior *ia*, which lies on a line imagined through anterior *post dc* and *sa*, moderately strong, *prsc* and *pra* rather small but distinct (but *pra* entirely absent in a male from Malaya);



93



94

FIG. 93. *Dichaetomyia latitarsis* (Stein), second to fifth segments of female fore tarsus.

FIG. 94. *Dichaetomyia heteromma* sp. n., male. Wings and legs omitted.

anterior mesopleural well developed (but absent in the other male from Malaya), infrasquamal hairs present, black, postalar declivity setulose, hypopleura with small hairs below spiracle and with small golden hairs above coxa. *Abdomen* subcircular to short-ovate, glossy very thinly dusted brown-grey, fourth segment with a marginal row of rather strong setae which become weaker towards middle, otherwise with strong lateral marginals and discals but without a trace of median ones, even on third segment. *Wings* subhyaline with a strong yellowish tinge, node of base of r_{4+5} with some small setulae on both dorsal and ventral surfaces, r_1 somewhat exceeding level of *r-m*, the latter only very little beyond middle of discal cell, r_{4+5} strongly curved backward and sinuous, *m* markedly upcurved at tip, *m-m* strongly oblique and in posterior part strongly concave outwardly. Calyptrae dull brownish-orange with concolorous border and fringe. Halteres dull reddish. *Legs* wholly pale ferruginous with piceous tarsi, in female distal three segments of fore tarsi (and to a less degree of mid tarsi) markedly dilated (Fig. 93) twice as wide as base of second; mid femur of male with 4–6 rather long *pv* setae, mid tibia with 2 strong *p* setae; hind femur on apical half with 5 (♀)–8 (♂) rather strong *av* setae, and near middle with 4–5 fine, in male stronger, *pv* setae, hind tibia with a small *pd*, a rather strong *ad* and 2–3 rather small *av* setae.

Length.—8·0–10·0 mm., of wings 8·4–10·0 mm.

Distribution.—INDIA (Nubbu, Dawnat Range; Pashok, Darjeeling Dist.; N. Khasi Hills and Tinsukia, Assam). N.E. BURMA. MALAYA. JAVA. SUMATRA. FLORES. PHILIPPINES (Luzon).

173. **Dichaetomyia heteromma** sp. n.

(Fig. 94)

♂ ♀ : Pale ferruginous with fuscous head, slightly browned mesonotum, and strongly browned apical half of abdomen, the tip being suffusedly paler, tarsi brown, antennae pale testaceous with most of third segment somewhat browned, palpi pale orange. *Head* moderately densely dusted brownish-grey, parafacialia and parafrontalia with pale yellowish-grey dust; eyes practically bare, in male somewhat flattened on anterior upper part where the facets are markedly enlarged, closely contiguous, interfrontalia absent at middle, only slightly visible in front of ocelli, but forming a moderately broad triangle at lunula, parafrontalia perfectly linear

on upper two-thirds, slightly broadened to lunula, with 4–5 inclinate setae and a number of fine hairs on anterior third and a fine hair near anterior ocellus, ocellars not very strong, verticals fine but distinguishable; frons of female a third head-width at vertex and at lunula, sometimes only one-tenth at vertex and over a third at lunula, so that it is slightly dilated anteriorly (with somewhat convex sides) instead of being parallel-sided, frontal triangle poorly defined, somewhat shining, narrowly drawn out to anterior sixth of frons, interfrontalia dull rufous-brown, slightly narrowed at extremities, 4–5 times as wide at middle as a parafrontale, the latter with 4–5 inclinate setae, some intercalated fine hairs and, to their outer side, a row of small proclinate hairs, ocellars very strong, verticals strong; parafacialia a quarter (♂) or a third (♀), jowls slightly exceeding, width of third antennal segment, the latter falling short of mouth-margin by half its own width; arista with dense rays, the longest, near middle, over half as long again as width of third antennal segment, but more or less bent distad at apical third, so that the plumosity is little wider at middle. *Thorax* moderately densely dusted whitish and brownish-white, in male the postsutural part distinctly dusted and with only the outer vittae distinct, whilst the inner vittae are very distinct in front of suture but very narrow, in female inner vittae broader, but *post* part almost undusted and therefore without distinct traces of vittae; *prsc* rather strong, anterior *ia* rather strong, in female somewhat anterior to, in male level with, *sa*, *pra* rather strong though much shorter than second *npl*; anterior mesopleural well developed, postalar declivity with a few pale hairs, hypopleura with some pale hairs just above hind coxa. *Abdomen* glossy with thin grey-brown dust, suffused on apical part; fourth segment with a row of strong marginals, for the rest with lateral marginals and discals only. *Wings* subhyaline with a slight brownish tinge, veins pale testaceous to light brown, bare on dorsal surface; r_1 reaching (♂) or slightly exceeding (♀) level of *r-m*, the latter beyond (♂), or almost at (♀), three-fifths of discal cell, r_{4+5} distinctly curved back and sinuous in apical part, *m* slightly curved forward at tip, *m-m* slightly oblique, the posterior part markedly concave outwardly. Calyptrae pale greyish-brown with concolorous border and golden fringe. Halteres yellowish-brown. *Legs* wholly pale with only the tarsi dark; mid femur with 6–7 *pv* setae from base to beyond middle, which in male become stronger as they are more distant from base, mid tibia with 2–3 strong *p* setae; hind femur with a row of *av* setae, which are short except for the last 2–3 near apex, which

are very long and strong, and with a few weak *pv* setae on about basal half, hind tibia with 1–2 small but rather conspicuous *pd* setae, a strong *ad* and 2–4 weak *av*.

Length.—6·1–8·3 mm., of wings 6·6–8·0 mm.

Distribution.—N.E. BURMA: Kambaiti, 2,000 m., 17.VI.34 (*R. Malaise*), ♂ type (in Mus. Stockholm), 5 ♂ 4 ♀ paratypes, 28.V.34, 1 ♂ paratype, 7.VI.34, 3 ♂ paratypes, 4.VI.34, 2 ♀ paratypes (paratypes in Mus. Stockholm, Helsinki and B.M.).

By Stein's key this species would be traced to *rufescens* Stein, but that species is known to have a bare pteropleura, no dark setulae on the metathoracic spiracle, and therefore belongs to a different genus (*Papuaia* Mall.).

174. **Dichaetomyia holoxantha** sp. n.

♀: Pale ferruginous with fuscous head and somewhat browned tarsi; palpi and antennae pale orange. *Head* rather densely dusted silver-white with pale testaceous clypeus and mouth-margin; eyes almost bare, frons at vertex one-fifth to one-fourth head-width (0·19–0·24), conspicuously dilated with straight sides to lunula, where it is three-tenths head-width, frontal triangle poorly defined, median line somewhat shining to beyond middle, interfrontalia dull fuscous, evenly slightly narrowed behind, hardly narrowed in front, 2–3 times as wide at middle as a parafrontale, the latter with 3–5 inclinate setae on anterior three-fifths, ocellars and verticals strong; parafacialia less than one-third, jowls almost, width of third antennal segment, the latter reaching mouth-margin and almost reaching level of vibrissae; arista with rather dense and subequal rays, the longest being almost twice as long as width of third antennal segment. Palpi pale-orange, somewhat compressed, the base sometimes browned. *Thorax* with the disc slightly darker ferruginous, on anterior half with a moderately broad white-dusted median vitta and a narrower vitta along each row of *dc*, the vittae becoming much fainter behind suture, shoulders and notopleurae also with some pale dust; anterior *prst dc* about half as long as second *prst dc*, *prsc* well developed, anterior *ia* rather weak, slightly anterior to level of *sa*, *pra* and anterior mesopleural well developed; postalar declivity with a few pale hairs, hypopleura with some pale hairs above hind coxa. *Abdomen* shining, very thinly dusted greyish, without any genuinely dark parts, anterior three segments with short but distinct lateral margins, fourth with lateral discals and a row of well-developed marginals. *Wings* somewhat yellowish subhyaline; veins testaceous to light brown, bare on dorsal surface;

r_1 somewhat exceeding level of *r-m*, the latter well beyond middle of discal cell, r_{4+5} markedly curved backward and slightly sigmoid at apex, *m* slightly but distinctly upcurved at tip. *m-m* slightly oblique and somewhat concave outwardly. Calyptrae yellowish-grey with creamy border and pale golden fringe. Halteres dull reddish-yellow. *Legs* wholly pale with only the tarsi somewhat browned, second to fourth segments of fore tarsi slightly incrassate in female, proximal 3–4 segments of mid and hind tarsi somewhat compressed; mid femur with a fine *v* seta at base, without outstanding *av* or *pv* setae, mid tibia with 2 strong *p* setae; hind femur with 3–4 *av* setae near apex, one of which is rather strong, and with a few *pv* setulae at apex, hind tibia without a distinct *pd* seta and with a moderately strong *ad* and 2 small *av* near middle.

Length.—5·8–6·5 mm., of wings 5·9–6·8 mm.

Distribution.—CEYLON: Parrara, 6.VI.92 (*Yerbury*), ♀ type; Haragam, 1.VI.92 (*Yerbury*), 1 ♀ paratype; Suduganga, 10.IX.19, on scrub (*R. Senior White*), 1 ♀ paratype; Matala East D., 22.IV.19, in forest (*R. Senior White*), 1 ♀ paratype (all in B.M.).

In addition there is in the B.M. a female from Kodaikanal, 7,000 ft., S. India, 25.III.36 (*B.M.-C.M. Exped. to S. India, 1936*). In this the third antennal segment is slightly darkened, except at base, the aristal rays are somewhat shorter, the fore tarsi are not markedly dilated, and the dorsum of the third and fourth tergites appears largely fuscous. It may be a different subspecies or even species, but more material is needed for deciding the status of this form.

D. holoxantha is very similar to *D. aurantiaca*, but apart from the *p* seta on the fore tibia *aurantiaca* differs by much shorter plumosity of the arista. In Stein's key *holoxantha* will be traced to *rufescens* which is a *Papuaia* (with bare pteropleura), or *flavipalpis*, in which the underside of the scutellum is finely pale haired.

175. **Dichaetomyia varipalpis** sp. n.

♂: Piceous-brown with shoulder, notopleura, postalar callus, scutellum, pleural sutures, ventral and lateral surfaces of first, and basal third of second, abdominal segment translucent testaceous; antennae whitish-yellow, palpi pale testaceous with brown basal half, trochanters and tibiae pale testaceous, hind tibia browned. *Head* moderately densely dusted pale grey, dust more brownish below; eyes very large, practically bare, with markedly enlarged anterior facets, closely contiguous on frons, interfrontalia obsolete, except at

lunula where they are visible as a small triangle not larger than lunula, parafrontalia and parafacialia linear or almost so, the former with 3–4 small inclinate setae on anterior third, which is slightly widened, and with 2–3 minute setulae towards anterior ocellus, ocellars rather small, verticals fine but distinct; jowls as wide as third antennal segment, the latter reaching mouth-margin; arista with rather dense rays of subequal length, the longest almost twice as long as width of third antennal segment. *Thorax* glossy, thinly dusted grey, in posterior view in front of suture with a pair of narrow widely separated dark paramedian vittae and, to the outer side of the slightly more dusted *dc* strip, with a trace of a broad vitta; *prsc* well developed, first *prst dc* smaller than second, anterior *ia* only just behind an imaginary straight line through *sa* and first *post dc*, *pra* short but quite strong; anterior mesopleural distinct, postalar declivity with some pale hairs, infrasquamal hairs present, black, hypopleura with some hairs both below spiracle and above hind coxa. *Abdomen* glossy piceous with very thin dark brown dust, basal third of second segment translucent testaceous except for a narrow dark brown median vitta; anterior three segments with only lateral marginals and discals, fourth with some lateral discals and a row of not very strong marginals. *Wings* yellowish subhyaline with ochraceous veins, their dorsal surface without setulae; r_1 reaching level of *r-m*, the latter beyond three-fifths of discal cell, r_{4+5} somewhat curved backward and markedly sinuous at apex, *m* slightly but distinctly upcurved at tip, *m-m* slightly oblique and rather straight. *Legs* with browned coxae, fore femur suffusedly paler at apex; mid femur with 1 *ad* pre-apical, some erect longer setulae on basal third of ventral surface, 4–5 long *pv* setae on more than basal half and some small *pv* setae from there to apex, mid tibia with 2 strong *p* setae; hind femur with a row of 6–7 strong widely spaced *av* setae and, on intermediate half, with 5 *pv* setae, hind tibia without a *pd* seta, with an *ad* and 3 *av* setae near middle.

Length.—4·6 mm., of wings 5·2 mm.

Distribution.—MALAYA: Bukit Kutu, Selangor, 3,500 ft., 18.IV.26 (*H. M. Pendlebury*), ♂ type (in B.M.). The specimen was labelled '*Dichaetomyia varipalpis* Type' by Malloch, but a description has apparently not been published. Stein's key takes this species to '*Mydaea*' *semimutata* Stein or *alterna* Stein. Both are *Dichaetomyia*, the former having, according to Malloch, a comb of *av* setae on the fore femur, and the latter having the palpi wholly dark, the third antennal

segment darkened, and the dark colouration of the abdomen apparently less uniform.

176. **Dichaetomyia nigricauda** sp. n.

♂ ♀: Pale ferruginous with somewhat darker mesonotum and sternopleura, fuscous head and piceous abdomen, which is suffusedly ferruginous at base of first segment, antennae and palpi orange-yellow, legs pale ferruginous with basal two-thirds of hind femur and the hind tibia browned in male, tarsi piceous-brown. *Head* moderately densely dusted brownish-grey, facial ridges and mouth-margin pale testaceous translucent, parafacialia and parafrontalia dusted silver-white; eyes practically bare, in male closely contiguous with the anterior facets markedly enlarged, interfrontalia obsolete except for anterior fourth, which is visible as a small triangle above lunula, parafrontalia perfectly linear, scarcely as wide together at middle as an ommatidium, with 2 minute reclinate hairs near anterior ocellus, slightly broadened to lunula where 1 strong and 2–3 weak and very weak inclinate setae are present, ocellars not very strong, verticals fine but distinct; frons of female almost a quarter head-width at vertex, evenly dilated with almost straight sides to lunula, where it is three-tenths head-width, frontal triangle undefined, represented by a shining spot in front of anterior ocellus, not distinctly reaching middle of frons, interfrontalia somewhat narrowed at extremities, almost four times as wide at middle as a parafrontale, the latter with one strong, one moderately strong and, alternating with them, two weak inclinate setae, ocellars and verticals strong; parafacialia linear, about as wide as base of arista, jowls slightly narrower than third antennal segment. This reaches mouth-margin; arista long-plumose, rays slowly decreasing in length from basal third (♂) or middle (♀) onwards, longest ones half as long again as width of third antennal segment. Palpi somewhat dilated. *Thorax* thinly dusted greyish-brown, in posterior view the dust quite conspicuous, as are the widely separated very narrow paramedian and broader outer undusted vittae, the *post* part in male more evenly dusted, in female undusted glossy; *prsc*, anterior *ia* and *pra* well developed but not very strong; anterior mesopleural fine but distinct, postalar declivity haired below and behind, infrasquamal hairs dark and rather numerous, hypopleura haired above coxa and below spiracle. *Abdomen* glossy, evenly and very thinly dusted brown, all segments with rather conspicuous lateral discals and marginals, fourth with a complete marginal row. *Wings* greyish subhyaline

with a brownish tinge, veins light brown with testaceous bases, dorsal surface without setulae; r_1 reaching level of *r-m*, which lies well beyond middle of discal cell, r_{4+5} and *m* somewhat converging at apex, r_{4+5} being slightly curved back and very shallowly sinuous, *m* distinctly, though in female very slightly, upcurved at tip; *m-m* only slightly oblique and concave. Calyptrae brownish-grey, subopaque, with brownish-cream border and golden fringe. Halteres dull reddish. *Legs*: Mid femur on basal third of *av* surface with a row of longer more erect setulose hairs, on basal half of *pv* surface with 4–5 strong erect setae, and with 2 small *a* pre-apicals, mid tibia with 2 strong *p* setae; hind femur with a complete row of rather unequal *av* setae, 2–4 near apex being very strong, and, in male, with a row of *pv* setae from basal fourth to almost apex, those near apical third being somewhat strong, in female only 2–3 rather strong submedian *pr* present, hind tibia with an *ad* and 2–3 *av* setae.

Length.—5·0–6·0 mm., of wings 5·8–6·2 mm.

Distribution.—MALAYA: Fraser's Hill, Pahang, 4,000 ft., 20.V.32 (*H. M. Pendlebury*), ♂ type, 29.I.29, ♂ paratype; Larut Hills, Perak, 4,500 ft., 20.II.32 (*H. M. Pendlebury*), 1 ♀ paratype (all in B.M.).

By the browned hind femora this species will be traced in Stein's key to his *semimutata*, but the mid femora are quite pale, and *semimutata* is much darker in colouration. Moreover, according to Malloch, its male has a comb of *av* setae on apical part of fore femur.

177. Dichaetomyia fulvoapicata sp. n.

♂ ♀: Pale ferruginous with fuscous head, disc of mesonotum more or less browned or fuscous, on the *dc* strip with a pair of rather broad pale ferruginous vittae (in some males only indicated behind neck), third abdominal segment, apical or more of second and basal three-quarters of fourth piceous. Antennae, palpi and legs pale ferruginous, third antennal segment largely infuscated, basal part of palpi (sometimes only apical fourth remaining pale) and tarsi brown. *Head* dusted somewhat brownish-grey; eyes almost bare, in male contiguous or practically contiguous, interfrontalia obsolete or linear at and above middle but visible as a short moderately broad triangle in front, parafrontalia perfectly linear on upper two-thirds, narrow below, where 3–4 inclinate setae alternate with a few fine hairs, upper part with 1–2 minute reclinate setulae, ocellars not very strong, verticals fine, rather indistinct; frons of female almost three-tenths (0·28–0·29)

head-width at vertex, evenly dilated with straight sides to lunula where it is fully a third (0·34) head-width, frontal triangle poorly defined, slightly shining, reaching anterior fourth of frons, interfrontalia slightly narrowed at extremities, 3–4 times as wide as a parafrontale, the latter with 1 strong and 3 weak inclinate setae, and to their outer side with a row of proclinate black setulae, ocellars and verticals strong; parafacialia linear in male, about as wide as base of arista, in female less than a third width of antennal segment, jowls about as wide as this segment, which reaches mouth-margin; arista long-plumose, rays slowly decreasing in length from basal third onwards, the longest half as long again as width of third antennal segment. *Thorax* with a broad brown to piceous median vitta, which is fused with the normal bare paramedian vittae, a dark elongate suffusion between the *prst dc* and the *prst* and another along the *ia*, in most males this pattern fuscous and fused, so that the mesonotum is wholly dark except at neck and at sides, a short wedge-shaped pale vitta extending from neck to anterior *prst dc*, dusted whitish-grey and greyish-brown, the dust conspicuous in posterior view especially on the dark parts; pleurae with brown suffusions, especially below; *prsc*, anterior *ia* and *pra* well developed but not very strong; anterior *prst dc* half as long as the others; anterior mesopleural rather fine, postalar declivity almost bare, infrasquamal hairs present, dark, hypopleura with some hairs above coxa. *Abdomen* glossy, with thin and even pale grey, on disc more brownish, dust, all segments with distinct lateral discals and marginals, fourth with a complete marginal row. *Wings* greyish subhyaline with testaceous to light brown veins, dorsal surface without setulae; r_1 reaching level of *r-m*, the latter near three-fifths of discal cell, r_{4+5} and *m* very slightly converging at apex, r_{4+5} being gently curved back and sinuous and *m* slightly curved up at tip; *m-m* slightly oblique and concave. Calyptrae pale greyish-brown to greyish-ochraceous, subopaque, with concolorous or partly brown border and golden fringe. Halteres reddish-yellow. *Legs* wholly pale, including coxae and trochanters, only tarsi brown; fore tibia without a submedian seta; mid femur with a *pv* seta at base and 1 (♀) or 2–4 (♂) near middle, in male moreover, with rather long erect *av*, *v* and *pv* hairs on basal half, mid tibia with 2 strong *p* setae; hind femur with 2–3 (♀) or 4–6 (♂) *av* towards apex and 1–2 (♀) or 3–6 (♂) *pv* near middle, hind tibia with 1 *ad* and 1 *av* seta near middle.

Length.—5·0–6·2 mm., of wings 5·7–6·3 mm.

Distribution.—INDIA: Shillong, Khasia Hills, Assam,

4.X.20, on marshy ground (*R. Senior White*), ♂ type, 3.X.20, 1 ♂ 1 ♀ paratypes, 9.X.20, shady scrub, 1 ♂ paratype; Cherrapunji, Khasia Hills, 18.X.20, 1 ♀ paratype. MALAYA: Fraser's Hill, Pahang, 4,000 ft., 28.I.29 (*H. M. Pendlebury*), 1 ♂ paratype (all in B.M.).

A male from Gauhati, Assam, 21.X.20, in forest (*R. Senior White*), differs from the others by somewhat greater size (7·2 mm., wings 6·6 mm.), more strongly enlarged anterior facets and wholly ferruginous thorax, which is only slightly browned on dorsum. The antennae are missing, and the other characters are as in the present species except for the fact that there are 2 *av* setae on the hind tibia.

178. **Dichaetomyia persimilis** sp. n.

(Fig. 95)

♂: Almost identical with *D. pendleburyi*, but fore femur without stronger *av* setulae towards apex. Apical prominence of superior forceps broader (Fig. 95*a*), apical part of inferior forceps rather strongly hood-shaped, much more sharply set off from posterior edge (Fig. 95*b*).

Distribution.—N.E. BURMA: Kambaiti, 2,000 m., 12–17.VI.34 (*R. Malaise*), ♂ type, 1,800 m., 7.VI.34, 2 ♂ paratypes, 2,000 m., 28.IV.34, 1 ♂ paratype. Type and paratype in Mus. Stockholm, 1 paratype each in Mus. Helsinki and B.M.

The typical series was at first believed to be an insignificant variation of *pendleburyi* without *av* setae of the fore femur, as the exterior characters are otherwise identical with those of *pendleburyi*. A dissection revealed, however, difference in the male genitalia, so that *persimilis* must be considered a species of its own, although it occurs together with *pendleburyi*.

179. **Dichaetomyia splendida** (Stein).

(Fig. 96)

1918. ! *Mydaea splendida* (Stein), *Ann. Mus. nat. Hungar.*, **XVI**, 172, 183. Type: Ceylon. Mus. Berlin.

Fuscous with the abdomen, shoulders, scutellum, postalar declivity, tibiae and at least posterior coxae, trochanters and femora pale ferruginous (disc of scutellum sometimes browned), some sutures and spots on the pleurae suffusedly ferruginous; antennae pale orange; fourth abdominal segment (Fig. 96) with a roundish piceous spot on each ventrolateral surface, tarsi browned or piceous, fore femur wholly

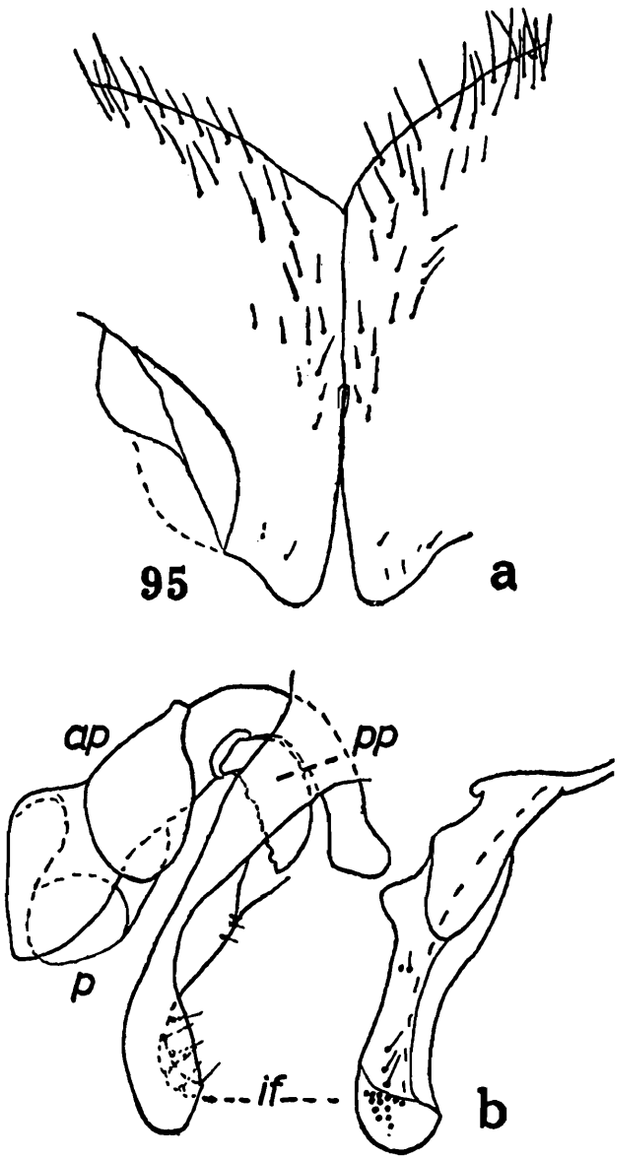


FIG. 95. *Dichaetomyia persimilis* sp. n., male genitalia. *a*, superior forceps; *b*, inferior forceps and penis, somewhat more strongly enlarged. *ap*, anterior paramere; *if*, inferior forceps; *p*, penis; *pp*, posterior paramere.

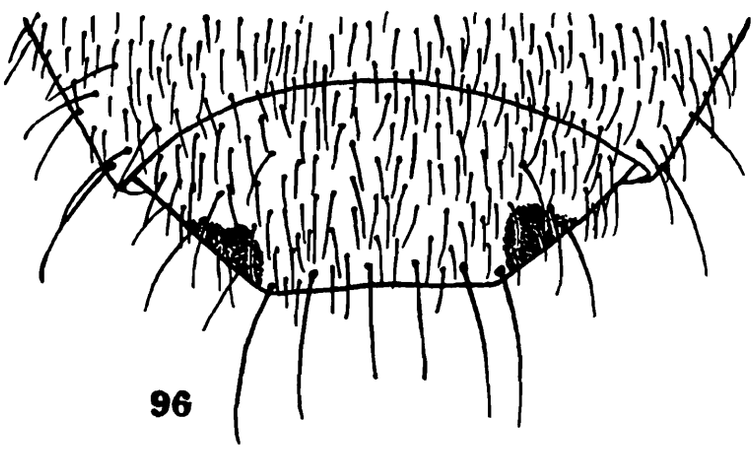


FIG. 96. *Dichaetomyia splendida* (Stein), tip of male abdomen, dorsal view.

pale (type) or largely piceous with the tip suffusedly pale ferruginous, mid femur sometimes to a greater or lesser extent infuscated. *Head* moderately densely dusted brownish-grey, clypeus, facial ridges, parafacialia and parafrontalia more silver-white; eyes almost bare, closely contiguous, interfrontalia obsolete except for a minute wedge-shaped part in front of anterior ocellus and the anterior third, which forms a narrow triangle at lunula, parafrontalia perfectly linear in posterior two-thirds, hardly wider at lunula, on anterior half with 5–6 inclinate setae, of which already the second is more or less hair-like, the last ones being minute, in addition with 1–2 small proclinate hairs near anterior ocellus, ocellars weak, verticals very weak and not very distinct; parafacialia linear in anterior view and not visible in profile, jowls less wide than third antennal segment, the latter reaching mouth-margin; arista with the rays subequal to about apical third, longest ones more than half as long again as width of third antennal segment. *Thorax* with rather densely and evenly greyish-brown dusted mesonotum if viewed from behind; paramedian vittae faint, narrow and widely separated, in posterior view not reaching suture, outer vittae vestigial; *prsc* not very strong, anterior *prst dc* about half as long as posterior one, anterior *ia* weak, slightly in front of level of *sa*, *pra* rather conspicuous though short; anterior mesopleural rather fine but distinct, postalar declivity with widely dispersed fine pale hairs, infrasquamal hairs conspicuous, black, hypopleura with some small hairs above coxa. *Abdomen* subcircular-subcordate, glossy and appearing undusted, the pollinosity being thin and brownish and visible only in certain directions; anterior segments with small lateral discals and marginals, third with stronger ones, the marginals connected by a row of very weak setae, fourth with lateral discals and a row of marginals; fourth ventrite with a very broad arched excision at apex. *Wings* subhyaline with a slight yellowish tinge, veins brown or light brown with paler bases, bare on dorsal surface; r_1 slightly exceeding level of *r-m*, which lies near three-fifths of discal cell, r_{4+5} slightly curved backward and sinuous, *m* slightly upcurved at tip. Calyptrae brown with darker border and fringe, lower one subopaque. Halteres pale reddish-yellow. *Legs:* Fore tibia without a *p* seta; mid femur near base with longer more erect hairs on *v* surfaces, *pv* surface with 3–6 weak setae on basal half, mid tibia with 2(–3) *p* setae; hind femur with a row of widely spaced not very strong *av* and *pv* setae on basal three-fifths and a denser comb-like row of short stout *va* and

pv setae on apical two-fifths, hind tibia with an *ad* and 2–3 rather weak *av* setae, the *ad* surface with a row of somewhat longer more erect hairs.

Length.—4·5–5·8 mm., of wings 4·4–5·6 mm.

Distribution.—CEYLON.

Very similar in colouration to *D. prolixa bioculata* Emd. (with 4 *post dc*) but in that form the spots of the fourth tergite are situated at middle of lateral surface and thus widely separated from hind margin, whereas in the present species they are adjacent to the latter and separated from it only by a linear pale border.

180. **Dichaetomyia umbrosa** sp. n.

♂ ♀: Fuscous with shoulder, propleura, postalar declivity and scutellum dull ferruginous translucent; in female lateral part of mesonotum and pleurae largely ferruginous; antennae orange with the third segment largely infuscated, legs pale ferruginous with piceous-brown coxae and the base of the femora broadly (♂) or narrowly (♀) piceous-brown suffused. *Head* dusted yellowish-grey, jowls more brownish-grey, facial ridges dull reddish translucent; eyes very sparsely haired, in male separated by about one-tenth head-width, interfrontalia at narrowest part at upper third somewhat wider than a parafrontale, the latter narrow, somewhat broadened anteriorly, with 4–6 rather strong and 1–2 weak inclinate setae on anterior three-fifths, the row being continued to almost level of anterior ocellus by 3 weak reclinate setae, ocellars moderately long, verticals fine but recognizable; frons of female at vertex a quarter, at lunula a third, head-width, frontal triangle rather well defined, slightly shining; hardly exceeding middle, interfrontalia thrice as wide at middle as a parafrontale, somewhat narrowed above, hardly narrowed at lunula, parafrontalia with 2 strong and 2–3 very small inclinate setae on anterior half and with an irregular row of proclinate setulae on outer part, the 2 strong inclinate, 2 strong reclinate and the strong inner vertical almost evenly spaced, outer vertical moderately strong, ocellars long; parafacialia a third as wide, jowls a third as wide again, as third antennal segment, the latter falling short of mouth-margin by half its own width, arista densely long-plumose, the rays becoming quickly shorter from apical third to tip, the longest rays twice as long as width of third antennal segment. *Thorax* rather densely dusted pale grey, with 4 (6) conspicuous sharply defined interrupted fuscous vittae, the

dust more brownish along median line and along inner side of the *ia*, scutellum with rather dense dust on each side of dorsal surface; *prsc* and anterior *ia* rather strong, the latter slightly anterior to level of *sa*, *pra* short but conspicuous; anterior mesopleural distinct, postalar declivity with fine dark hairs, infrasquamal hairs absent, hypopleura with a few black setulae above hind coxae, in the Kuala Teku specimen also with some hairs in front of metathoracic spiracle. *Abdomen* wholly fuscous, moderately densely dusted grey with some brown dust on disc, in male with a vestigial linear median vitta, in female glossy with the dust more conspicuous in an anterodorsal than in a posterodorsal view; anterior segments with only lateral marginals and discals, third and fourth with lateral discals and a complete row of rather strong marginals, discals on fourth segment extending further towards middle, so as to form a broadly interrupted discal row. *Wings* subhyaline with a conspicuous yellowish-brown tinge, veins light brown with ochraceous base, bare on dorsal surface; r_1 slightly exceeding level of *r-m*, the latter beyond middle of discal cell; r_{4+5} moderately curved backward and slightly sinuous at apex, *m* very slightly upcurved or virtually straight at tip, *m-m* somewhat oblique and sinuous. Calyptrae brownish-grey with whitish-brown border and pale golden fringe. Halteres reddish-yellow. *Legs* with pale ferruginous tarsi, the brown colouration of the femora more extended on *d* than on *v* surface, in female only present at base of *d* surface; mid-femur with 4–6 long *pv* setae on basal half and a row of smallish *p* setae near apex, in male further with 1–2 long *av* near base, mid tibia with 2 strong *p* setae; hind femur with a complete row of long *av* setae, which become slightly stronger near apex and, in basal half, with 4 long *pv* setae, hind tibia without a distinct *pv* seta and with a moderately strong *ad* and small 3 *av* at middle.

Length.—8·0–9·0 mm., of wings 8·8–9·7 mm.

Distribution.—MALAYA: Bukit Kutu, 3,300 ft., Selangor, 11.III.31 (*H. M. Pendlebury*), ♂ type, 3,500 ft., 11.IX.29, 1 ♂ paratype; Kuala Teku, 500 ft., Pahang, 3.XII.21 (*H. M. Pendlebury*), 1 ♂ paratype (damaged by *Anthrenus*, labelled '*umbrosa*' by Malloch); Lubok Tamang, 3,500 ft., Pahang, 9.VI.23 (*H. M. Pendlebury*), 1 ♀ paratype (in B.M.; 1 ♂ paratype in U.S. Nat. Mus., Washington).

In Stein's key *umbrosa* will be traced to *cognata* (Stein) from Java, the male of which has 'contiguous eyes'. *Dichaetomyia cognata*, however, is much smaller, more slender, and has the scutellum and halteres dark.

181. Dichaetomyia flavocaudata Malloch.

1925. *Dichaetomyia flavocaudata* Mall., *Philipp. J. Sci.*, XXVI, 327. Type: Mt. Makiling. U.S. Nat. Mus.
1925. ! *Dichaetomyia dimidiata* (Stein), Mall., *Philipp. J. Sci.*, XXVI, 326, nec Stein.

Piceous with pale ferruginous shoulders and, usually, the lateral area from there to wing base, first abdominal segment, base of second and tip of fourth also pale, antennae pale orange, palpi fuscous, legs piceous-brown, tibiae slightly paler. Extremely similar to *varipalpis*, from which it differs by the dark palpi and scutellum, the wholly dark fore femora, darker anterior tibiae, and the pale tip of the fourth abdominal segment. The longest rays of the arista are only half as long again as width of third antennal segment. Third abdominal segment of male with a row of well-developed marginals. In all specimens, except the only one with dark notopleura, r_1 exceeds somewhat level of *r-m*, and the latter lies much before three-fifths of discal cell. Mid femur in all specimens with 2 *ad* pre-apicals, hind tibia with 1–2 *av*. Otherwise fitting the description of *varipalpis*.

Length.—5·2–5·6 mm., of wings 4·7–6·3 mm.

Distribution.—PHILIPPINE IS. (Luzon). MALAYA (Selangor: Bukit Kutu).

The description is based on a female paratype (in B.M.) and four males from Malaya. The marginals of the third tergite are indistinct, except laterally, in this female. One of the males from Bukit Kutu has the dorsolateral part of the thorax behind the shoulders dark like the form which Malloch lists as *dimidiata* from Mt. Makiling. The fourth Malayan specimen (Kanclung Forest, Selangor) is intermediate between *varipalpis* and the present form, having the extreme tip of the palpi yellow and the scutellum yellow, but two pre-apicals on the mid femora and the tip of the abdomen pale. Possibly all these forms belong to only one very variable species. *D. dimidiata* (Stein) is somewhat larger (6·5 mm. long) but otherwise extremely similar to the form with dark scutellum.

182. Dichaetomyia subumbrosa sp. n.

♂ ♀: Pale ferruginous with fuscous head and apical part of abdomen, mesonotum darker ferruginous, more or less infuscated on disc, especially on and near the paramedian vittae, ventral parts of thorax, and usually pleurae, with large dark suffusions, palpi fuscous, antennae orange to orange-yellow,

legs pale ferruginous, tips of tarsi somewhat browned, in female coxae and base of femora sometimes browned. *Head* dusted brownish-grey, clypeus somewhat testaceous translucent, especially on facial ridges, dusted yellowish-white, parafacialia and parafrontalia golden-whitish; eyes practically bare, in male contiguous or subcontiguous, interfrontalia fuscous, obsolete or linear above middle, visible as a minute triangle in front of ocellar tubercle and as a small triangle above lunula, parafrontalia linear, slightly widened to lunula, with 3–5 inclinate setae and a few setulae on anterior two-fifths and a small reclinate hair near anterior ocellus, ocellars moderately strong, verticals short and fine but clearly distinguishable; frons of female almost a quarter head-width at vertex, moderately dilated with almost straight or slightly concave sides to lunula, where it is almost a third (0·30–0·32) head-width, interfrontalia fuscous-black, almost parallel-sided, only slightly wider at middle, where they are almost or fully thrice as wide as a parafrontale, the latter on anterior half with 3 inclinate setae, the first of them strong, and on outer part with some small black proclinate setulae, ocellars and verticals strong; parafacialia a third, jowls fully, width of third antennal segment; arista densely long-plumose, rays of subequal length and largely twice as long as width of third antennal segment, quickly becoming shorter in apical fourth. *Thorax* in male rather densely dusted whitish-grey and pale brown, with four narrow incomplete vittae, which appear matt fuscous-black in posterior view at least in front of suture, in females sometimes dusted only on anterior declivity and therefore more shining and with less conspicuous vittae; *prsc* well developed, anterior *ia* moderately strong, somewhat anterior to level of *sa*, *pra* short but very distinct; anterior mesopleural well developed, postalar declivity almost bare, hypopleura with some setulae above hind coxa (in one female these extend upward almost to spiracle). *Abdomen* very thinly dusted brownish, rather strongly shining, especially in female where the dark colouration is piceous rather than fuscous and approaches or reaches base; in male at least the apical two segments wholly or largely fuscous with slight brassy reflections, second segment at least with dark hind margin, often wholly infuscated; anterior segments with only lateral marginals and discals, third and fourth with a row of rather strong marginals and 2–3 lateral discals. *Wings* subhyaline with a conspicuous yellowish tinge, especially on basal part of fore margin, veins light brown to ochraceous, bare on dorsal surface; r_1 slightly exceeding level of *r-m*, the

latter almost at three-fifths of discal cell, r_{4+5} and *m* markedly converging at apex, the former somewhat curved backward and slightly sigmoid, *m* slightly but distinctly upcurved, *m-m* moderately oblique and rather straight. Calyptrae subopaque, ochraceous-brown with pale brownish border and pale golden fringe. Halteres pale reddish-yellow. *Legs:* Mid-femur with about 5 *pv* setae on basal half and a row of rather long fine *p* setulae on apical third, mid tibia with 2–3 strong *p* setae; hind femur with a dense *ad* row, an *av* row and on basal two-thirds a row of *pv* setae, the distal ones smaller, hind tibia with 1–2 indistinct small *pd* setulae, an *ad* at middle and 2–3 small *av* about opposite the *ad*.

Length.—5·7–8·3 mm., of wings 6·3–7·8 mm.

Distribution.—MALAYA: Larut Hills, Perak, 3,700 ft., 8.II.22 (*H. M. Pendlebury*), ♂ type, 4,500 ft., 20 and 24.II.22 (*H. M. Pendlebury*), 2 ♀ paratypes, Fraser's Hill, Pahang, 4,000–4,200 ft., 29.I.29, 14.VII.36, 28.XI.36 (*H. M. Pendlebury*), 1 ♂ 2 ♀ paratypes; Kedah Peak, 3,500 ft., 29.III.28 (*H. M. Pendlebury*), 1 ♂ paratype (type and paratypes in B.M., 1 paratype in U.S. Nat. Mus.). S. INDIA: Thekkadi, Periyar Dam, Travancore, 6–10.V.37 (*B.M.-C.M. Exped. to S. India*), 1 ♂. N.E. BURMA: Kambaiti, 1,800 m., 17.VI.34 (*R. Malaise*), 1 ♀.

In the single Travancore specimen, a male, the eyes are more closely contiguous, the ocellars weak, the thoracic vittae in posterior view appear as evenly dusted as the space between them but a little more brownish, the hind tibia with 2–3 *ad* setae. It seems rather probable that this specimen represents a separate species. The female from Kambaiti has the mesonotum more dusted and much less shiny. The females with dark femora will be traced to *semimutata* in Stein's key, but in this species the male has a comb on the fore femur according to Malloch. The male will work out to '*Mydaea*' *splendida* Stein, in which the abdomen and tarsi are differently coloured, *m-m* is more oblique, the border of the calyptrae is blackish; the hind tibia of the Ceylonese *splendida* has only the normal single *ad* seta.

183. Dichaetomyia varicauda sp. n.

(Fig. 97)

♂ ♀: Pale ferruginous with fuscous head, largely fuscous tarsi, a piceous vitta on mesonotum and piceous bands on abdomen, pleurae with more or less large and numerous piceous suffusions. Palpi fuscous-brown. Antennae pale reddish-yellow. *Head* rather densely dusted brownish-grey, facial

ridges ferruginous translucent, parafacialia and parafrontalia somewhat more densely dusted silver-grey; eyes almost bare, in male closely contiguous, interfrontalia obsolete except in anterior fourth where they are visible as a small fuscous triangle, parafrontalia linear in posterior two-thirds, slightly widened anteriorly, where 3–4 inclinate setae are present, ocellars well developed (according to the pores), verticals small but distinct; frons of female at vertex almost a quarter to almost three-tenths head-width (0·23–2·29), evenly broadened with almost straight sides to lunula where it is three-tenths to well over one-third head-width (0·31–0·37), frontal triangle ill-defined, slightly shining, indefinitely passing middle, interfrontalia somewhat narrowed above and below, 3–4 times the width of a parafrontale at middle, parafrontalia with 3–5 inclinate setae, some of these fine and sometimes small (in the Siruvani specimen, to which the smallest figures of frontal width refer, only two setae strong), and on outer part with a row of proclinate black setulae, ocellars and verticals strong; parafacialia a quarter to almost a third, jowls fully, width of third antennal segment; the latter almost or quite reaching mouth-margin; rays of arista subequal to apical fourth on which they quickly decrease in length, longest ones one-quarter to one-half again as long as width of third antennal segment. *Thorax* with moderately

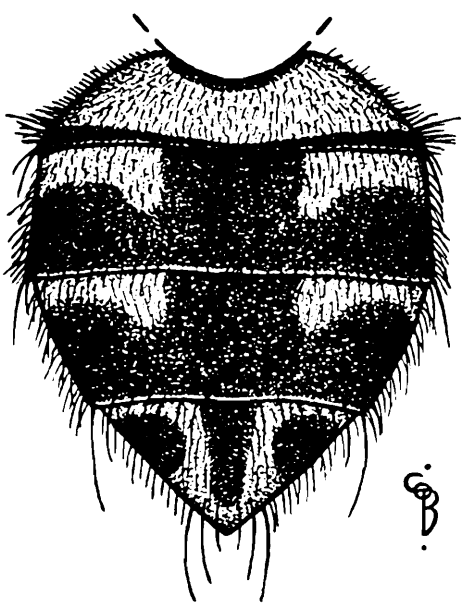


FIG. 97. *Dichaetomyia varicauda* sp. n., female abdomen.

broad fuscous (seldom paler) paramedian vittae, which in posterior view are separated by whitish dust but which in dorsal view tend to fuse behind suture, in addition with a pair of incomplete outer vittae which are usually fuscous at

least in front of suture; *prsc* and anterior *ia* distinct, the latter well in front of level of *sa*, *pra* conspicuous, anterior mesopleural small, postalar declivity with some fine pale setulae, hypopleura with some fine hairs above hind coxa. *Abdomen* with a broad piceous sinuous hind margin, which rather broadly reaches base on median line and which occupies almost the whole of the dorsal surface on third segment, second segment similar (but in the Siruvani specimen with only a triangular median spot and a narrow brown hind margin), first segment with a narrow brown hind margin, fourth with a median spot, which usually forms a vitta from base to almost apex, and a pair of transverse-ovate spots; tergites with lateral discals and lateral marginals, only the fourth with a well-developed marginal row. *Wings* subhyaline, slightly yellowish-grey, veins light brown with pale bases, bare on dorsal surface; r_1 slightly exceeding *r-m*, the latter well beyond middle of discal cell, r_{4+5} and *m* converging at apex, r_{4+5} somewhat curved back and sinuous, *m* markedly upcurved, *m-m* slightly oblique and concave. Calyptrae pale greyish-brown, the border sometimes somewhat browned, fringe pale golden. Halteres very pale reddish-yellow. *Legs:* Pale ferruginous with black tarsi, hind tarsi fully as long as tibia; mid femur with about 3 *pv* setae on less than basal half, mid tibia with 2 strong *p* setae; hind femur with a rather dense *ad* row and, in male, with 3–4 strong *av* near apex and with 3–4 strong but rather short setae at apical third, in female with a row of widely spaced rather unequal *av* setae, the pre-apical 3–4 of which are strong, and a few weak *pv* bristles, hind tibia with a very small *pd* seta, an *ad* and 1–2(–3) *av*.

Length.—5·3–8·6 mm., of wings 5·4–9·1 mm.

Distribution.—N.E. BURMA: Kambaiti, 2,000 m., 7.VI.34 (*R. Malaise*), ♂ type, 6.IV–17.VI.34, 24 ♀ paratypes. S. INDIA: Siruvani-Muthikolam, 1,700–3,000 ft., Coimbatore Dist., 23–26.IX.38 (*B.M.-C.M. Exped. to S. India*), 1 ♀. N. INDIA: Pashok, Darjeeling Dist., 2,000 ft. (*F. H. Gravely*), 2 ♀ paratypes (in B.M. and Indian Mus., Calcutta).

The Siruvani specimen differs in several characters and may represent a separate species. In the colouration of the fourth tergite *varicauda* tallies with *'Mydaea' alterna* Stein, but in that species the femora are wholly dark brown. *M. alterna* is said to be very similar to *flavipalpis*, but it is not known whether the underside of the scutellum is hairy as in the latter species. As *varicauda* will be traced to *flavipalpis* in Stein's key, it may be that it is only a subspecies of *alterna*, but that key is based almost exclusively on differences

of colour and, therefore, does not enable conclusions about relationship to be drawn.

184. **Dichaetomyia handschini** sp. n.

♀ : Pale ferruginous with fuscous head, normally a large piceous median spot on intermediate tergites, piceous tarsi and pale orange antennae with infuscated apical half of third segment. *Head* moderately densely dusted greyish-brown, clypeus, facial ridges, parafacialia and anterior part of parafrontalia dusted yellowish silver-white, rest of parafrontalia with thin greyish-brown dust; eyes almost bare, frons at vertex less than a quarter (0·23–0·24) head-width, moderately dilated with almost straight sides to lunula, where it is up to three-tenths (0·26–0·30) head-width, frontal triangle ill-defined, somewhat shining, fading out near anterior third of frons, interfrontalia gradually but markedly narrowed to extremities, about four times as wide at middle as a parafrontale, the latter on anterior three-fifths with 5–6 inclinate setae, of which the first and usually fourth are strong and between which a few hairs may be interposed, and on outer part with a row of very small proclinate setulae, ocellars and verticals strong; parafacialia linear or obsolete in profile, jowls two-thirds width of third antennal segment, the latter reaching mouth-margin; arista plumose, rays very slowly becoming shorter from basal third onwards, longest rays a third longer than width of third antennal segment. *Thorax* in posterior view with moderately dense brownish-white dust, especially in front of suture, the dust more yellowish-white in shoulder region and fainter towards scutellum, in front of suture four moderately narrow pale ferruginous or ferruginous undusted vittae present, which are represented by six broader ones behind suture, so that the pale dusted median vitta becomes much narrower and that along the *dc* very narrow to vestigial; scutellum appearing undusted in posterior view; *prsc* moderately strong, anterior *prst dc* about half as long as posterior, anterior *ia* not very strong, somewhat in front of level of *sa*, *pra* conspicuous; anterior mesopleural small but conspicuous, infrasquamal hairs present, black, postalar declivity with some small pale hairs, hypopleura with 1–2 minute pale hairs below spiracle and a few more above coxa. *Abdomen* evenly and very thinly dusted brown, in posterior view glossy and appearing undusted; with only lateral marginals and discals except for fourth segment, which has a complete row of not very strong marginals. *Wings* subhyaline, with a rather strong yellowish-smoky tinge, veins pale testaceous,

bare on dorsal surface; r_1 markedly exceeding level of *r-m*, which lies beyond middle of discal cell, r_{4+5} somewhat curved backward, slightly sinuous at apex, *m* somewhat upcurved at tip, *m-m* slightly oblique and somewhat concave outwardly at middle. Calyptrae ochraceous with concolorous border and golden fringe, lower one subopaque. Halteres pale reddish-yellow. *Legs:* Mid femur with some erect setulae at base of *av* surface, 1–4 rather weak *pv* setae in basal third and a row of slightly outstanding setulae along *av* and *pv* surfaces (more distinct on apical third), mid tibia with 2–3 *p* setae; hind femur with a row of rather irregular *av* setae, which are more or less weak except for 2–4 near apex, and 1–2 *pv* towards middle, hind tibia with an *ad*, 2 *av* and without or with a small *pd* seta.

Length.—4·8–5·8 mm., of wings 4·9–5·8 mm.

Distribution.—CEYLON: Belihul Oya, Sab., 11.II.54 (*F Keiser*), ♀ type, 3 ♀ paratypes, 10.II.54, 1 ♀ paratype; Haragama, C.P., 14.I.54 (*F Keiser*), 2 ♀ paratypes; Peradeniya Exper. Sta., C.P., 4.XI.53 (*F Keiser*), 1 ♀ paratype; Deiyannewela, Kandy, C.P., 2.XI.53 (*F Keiser*), 2 ♀ paratypes (type and paratypes in Mus. Basle, paratypes in B.M.).

185. **Dichaetomyia setifemur** Malloch.

1928. *Dichaetomyia setifemur* Mall., *Ent. Mitt.*, **XVII**, 321. Type: Fort de Kock. Mus. Amsterdam.

Pale ferruginous with fuscous head and largely piceous abdomen, tip of fourth tergite orange-yellow, base of first broadly pale ferruginous, palpi and antennae orange-yellow, third antennal segment largely somewhat browned, tarsi of male strongly browned. *Head* moderately densely dusted brownish-grey, parafrontalia and parafacialia densely dusted silver-white, facial ridges and clypeus pale reddish-yellow translucent, especially in male; eyes almost bare, in male contiguous, interfrontalia obsolete except for a small triangle (anterior third) above lunula and a wedge-like line along each side of frontal triangle, parafrontalia linear, a little wider at anterior end, where 5 inclinate setae are present, upper part with 2 tiny reclinate setulae in front of ocellar triangle, ocellars strong, outer verticals moderately strong, inner verticals (?) fine and rather indistinct; frons of female at vertex a quarter head-width (0·23–0·27), evenly dilated with practically straight sides to lunula where it is almost a third head-width, frontal triangle slightly shining, traceable to anterior fifth of frons, interfrontalia almost parallel-sided, almost or

fully thrice as wide at middle as a parafrontale, the latter on anterior half with 2 strong inclinate setae and 2–3 inclinate setulae, on outer part with a few proclinate black setulae, ocellars and verticals strong; parafacialia a third to a quarter, jowls fully, width of third antennal segment; the latter almost (♂) or fully (♀) reaching mouth-margin; arista long with numerous rays of subequal length, which become quickly shorter on apical fourth or third, longest rays in male almost twice, in female 1·5 times, as long as width of third antennal segment. *Thorax* with three vittae of whitish dust, which gradually fade out behind, the median one broad, lateral region with some yellowish dust, the 4 (behind suture 6) undusted vittae sharply defined, the median dusted vitta in male superimposed upon a broad suffused brown vitta, in female the vittae in front of suture and the one outward of the *dc* behind suture, sometimes conspicuously browned, the mesonotum sometimes largely fuscous; *prsc* and anterior *ia* well developed, the latter only slightly anterior to level of *sa*, *pra* conspicuous; anterior mesopleural distinct, infrasquamal hairs present, dark, postalar declivity with a few pale hairs, hypopleura with some hairs both below spiracle and above hind coxa. *Abdomen* evenly glossy with very thin (♂) or thin (♀) brownish dust; the first three segments with only lateral marginals and discals, the marginals of the third segment somewhat more distinct near middle, fourth segment with lateral discals and a row of rather strong marginals. *Wings* yellowish-grey subhyaline with light brown and ochraceous veins, these are bare on dorsal surface except for the stem-vein; r_1 reaching level of *r-m*, the latter well beyond middle of discal cell, r_{4+5} and *m* markedly converging at apex, r_{4+5} considerably curved backward and distinctly sinuous, *m* very slightly upcurved, *m-m* markedly oblique and sinuous, in male more strongly so. Calyptrae pale orange, in female more pale greyish-ochraceous, with pale brownish border and pale golden fringe. Halteres pale reddish-yellow. *Legs:* Fore femur of male with a comb of short strong *av* setae on apical half, fore femur of female without a distinct indication of this comb; mid femur on more than basal half with a fringe of fine even *pv* setae and in male on apical two-fifths with a comb of short moderately strong *av* setae; in female these are recognizable as a row of slightly longer *av* setulae; mid tibia with two strong *p* setae; hind femur with an *ad* row and an *av* row which becomes conspicuous only on less than apical half, where it consists of short but strong setae, *pv* row in female consisting of fine setae or indistinct, in male formed by long strong more *v* setae in basal half and short rather strong

setae in apical half, hind tibia with or without a small *pd* and with an *ad* and 2–3 *av* setae.

Length.—5·8–8·2 mm., of wings 5·9–8·8 mm.; the type is 9·5 mm. long according to Malloch.

Distribution.—SUMATRA: Fort de Kock. MALAYA: Fraser's Hill, Pahang. N.E. BURMA: Kambaiti.

186. **Dichaetomyia brunneitibia** sp. n.

♂ ♀: Pale ferruginous with fuscous head; mesonotum not infuscated or only infuscated on anterior part between the pair of *dc* rows, abdomen largely piceous, tarsi fuscous, antennae pale orange with the third segment largely somewhat browned. *Head* moderately densely dusted brownish-grey, dust of parafacialia and parafrontalia pale golden-grey, facial ridges and face dull orange translucent; eyes practically bare, in male somewhat flattened dorsally and with the facets on this part conspicuously larger, closely contiguous, interfrontalia obsolete except on a minute triangle near ocelli and in anterior third, which forms a rather broad triangle at lunula, parafrontalia almost obsolete, finely linear, somewhat broadened in anterior third, which carries 1 strong and 4–5 weak to hair-like inclinate setae, towards anterior ocellus with 2 minute reclinate hairs, ocellars small, verticals very small and fine, not very distinct; frons of female at vertex almost three-tenths (0·27–0·29) head-width, evenly dilated, with very slightly concave sides, to lunula where it is almost a third head-width, frontal triangle reaching middle, apex indistinctly prolonged, interfrontalia slightly narrowed at extremities, almost four times as wide at middle as a parafrontale, the latter with 2–3 strong and about 2 weak inclinate setae in somewhat more than anterior half and with only a few small proclinate hairs on outer part, ocellars and verticals strong; parafacialia a third (♂) or fourth (♀), jowls equalling, width of third antennal segment, the latter reaching mouth-margin; arista with rather numerous rays of subequal length, which become quickly shorter on apical fifth, the longest being in male almost twice, in female one-and-a-half times, as long as width of third antennal segment. *Thorax* dusted whitish-grey, especially on anterior half, in male with linear widely separated paramedian vittae, which do not reach beyond suture, and with moderately broad interrupted outer vittae, in female with broader and longer undusted vittae; *prsc* moderately strong to weak, anterior *ia* not very strong, slightly anterior to level of *sa*, *pra* conspicuous; anterior mesopleural distinct, infrasquamal hairs present,

black, postalar declivity with a few pale hairs below, hypopleura with some hairs above coxa and below spiracles, the latter hairs being difficult to see, especially in female. *Abdomen* glossy, evenly thinly dusted brownish and therefore with slightly brassy reflections; lateral marginals and discals well developed on all segments, especially in male, third segment with weak marginals completing the row, fourth with a well-developed marginal row. *Wings* yellowish-grey subhyaline, more conspicuously yellowish on anterior part of base; veins ochraceous, bare on dorsal surface, except for stem-vein; r_1 reaching or slightly exceeding level of *r-m*, the latter in male almost at two-thirds, in female well beyond middle, of discal cell, r_{4+5} and *m* slightly converging at apex, r_{4+5} being somewhat curved back and very slightly sinuous, *m* being slightly upcurved, *m-m* slightly oblique and sinuous. Calyptrae pale greyish-ferruginous with concolorous border and pale golden fringe. Halteres dull reddish-yellow. *Legs* with markedly browned tibiae (to be viewed against the body); fore femur without a pre-apical comb of *av* setulae; mid femur with a row of weak *pv* setae on basal half, mid tibia with 2 strong *p* setae; hind femur with an *av* row which consists of very weak and short setae on basal half and 4–6 strong ones on apical half, and without outstanding *pv* setae, hind tibia with a very small *pd*, an *ad* and 2–4 *av* setae.

Length.—5·0–5·7 mm., of wings 5·1–6·2 mm.

Distribution.—MALAYA: Fraser's Hill, Pahang, 4,000 ft., 30.V.32 (*H. M Pendlebury*), ♂ type, 25.I.29, 2 ♀ paratypes; Kedah Peak, 3,000–3,500 ft., 15.III.28 (*H. M. Pendlebury*), 1 ♂ paratype; Cameron Highlands, Pahang, 4,800 ft., 20.VI.35 (*H. M Pendlebury*), 2 ♀ paratypes; Larut Hills, Perak, 4,500 ft., 21.II.32 (*H. M. Pendlebury*), 1 ♀ paratype in B.M., paratypes also in U.S. Nat. Mus. N.E. BURMA: Kambaiti, 1,800 m., 7.VI.34 (*R. Malaise*), 1 ♀ paratype (in Mus. Stockholm). S. INDIA: Nadungayam, Malabar, 200 ft., 16–22.IX.38 (*B.M.-C.M. Exped.*), 1 teneral ♂

In the Kambaiti specimen the browning of the tibiae is only just noticeable, and in the Nadungayam male it is not visible at all. In the latter the abdomen also is largely pale, and it may belong to a different species; as the femora show no trace of an *av* apical comb, the specimen appears to be more closely related to the present species than to *apicalis*. In both Stein's and Malloch's keys *brunneitibia* will be traced to *apicalis* Stein, from which it differs by the pale tip of the abdomen. The setulose stem-vein approaches the present species to *pilinervis* Mall. (and one of the Fraser's Hill females was tentatively named thus by Malloch), but in addition to

the darker mesonotum, the pale base of the second tergite and the pale tibiae, *pilinervis* differs by the presence of a comb on the fore femur of the male.

187. **Dichaetomyia apicalis** (Stein).

(Fig. 98*b*)

1904. ! *Spilogaster apicalis* Stein, *Tijdschr. Ent.*, **XLVII**, 103 (♂). Type: Java. Mus. Amsterdam.
1909. *Mydaea apicalis* (Stein), *Tijdschr. Ent.*, **LII**, 229 (♂ ♀); 1915, *Suppl. ent.*, **IV**, 22; 1918, *Ann. Mus. nat. Hungar.*, **XVI**, 152, 183; 1920, *Tijdschr. Ent.*, **LXII**, Suppl., 43, 49.
1925. *Dichaetomyia apicalis* Stein, Mall., *Phil. J. Sci.*, **XXVI**, 324, 331; Karl, 1935, *Arb. morph. taxon. Ent.*, **II**, 41; Hennig, 1952, *Beitr. Ent.*, **II**, 83.
1927. *Lophomala apicalis* (Stein), End., *Konowia*, **VI**, 55.

Pale ferruginous with fuscous head, piceous-black abdomen with pale base, pale brownish-yellow antennae with somewhat darkened third segment (except for its base), fuscous-brown palpi and browned tarsi; disc of mesonotum often somewhat browned, especially anteriorly, in posterior view the *prst* part moderately densely dusted whitish with a pair of broadly separated linear paramedian vittae and the beginning of a faint broad outer vitta; first abdominal segment wholly pale or with the hind margin infuscated, second tergite in the latter case wholly piceous, in other cases wholly pale or with a wedge-shaped median vitta or almost wholly piceous, third wholly or almost wholly piceous, the lateral part of fore margin being sometimes pale. *Head* moderately densely dusted brownish-grey, parafacialia and parafrontalia densely dusted yellowish-white; eyes very short-haired, almost bare, in male closely contiguous, interfrontalia triangularly dilated at lunula, otherwise obsolete, parafrontalia linear, slightly widened near lunula, with 3–5 inclinate setae, of which only 2–3 are strong, and 2 small reclinate hairs near anterior ocellus, ocellars moderately strong, verticals very fine or indistinct; frons of female a quarter head-width at vertex, three-tenths (0·26–0·30) at lunula, frontal triangle ill-defined, slightly shining, fading out at anterior quarter of frons, interfrontalia almost parallel-sided, about thrice as wide at middle as a parafrontale, the latter with 2–3 strong and 1–2 small inclinate setae on anterior half, anterior reclinate seta rather weak, ocellars strong, inner verticals strong, outer ones moderately strong; parafacialia linear, especially in male, jowls as wide as third antennal segment; the latter reaching mouth-margin, arista with rather dense rays of

subequal length, the longest being half as long again as width of third antennal segment. *Thorax* somewhat shining, *prsc* rather strong, anterior *ia* rather weak, sometimes vestigial, *pra* small but distinct; anterior mesopleural well developed, postalar declivity with a group of small dark hairs, hypopleura with some hairs above hind coxa. *Abdomen* shining with very thin evenly distributed dust, anterior three segments with only lateral discals and marginals, fourth with a row of moderately strong marginals and with 2–3 lateral discals on each side. *Wings* yellowish-smoky, subhyaline with testaceous veins, which are bare on dorsal surface; r_1 slightly exceeding *r-m*, which lies beyond middle of discal

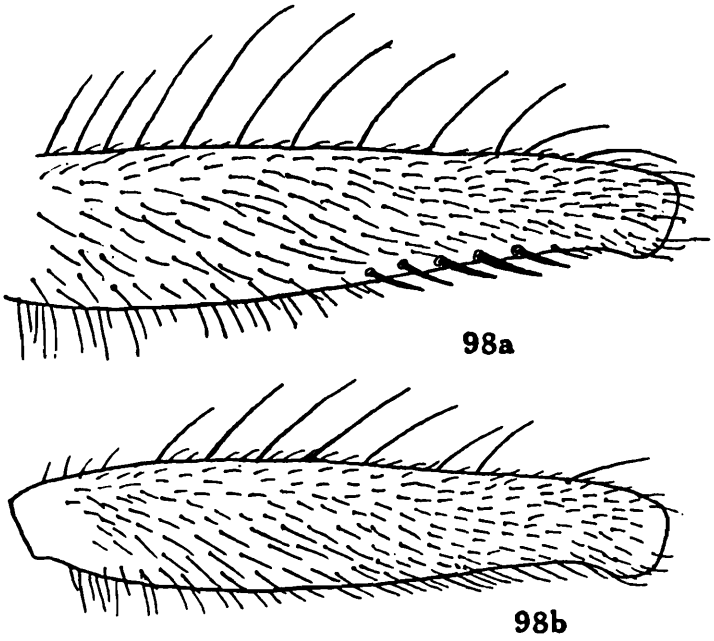


FIG. 98. Anterior view of left fore femur of (*a*) *Dichaetomyia pectinipes* (Stein); (*b*) *Dichaetomyia apicalis* (Stein).

cell; r_{4+5} somewhat curved backward and shallowly but distinctly sinuous, *m* distinctly upcurved at apex, *m-m* moderately oblique and in male somewhat sinuous. Calyptrae pale greyish-brown with brownish or brownish-cream border and golden fringe. Halteres dull reddish-yellow. *Legs* wholly pale, only tarsi somewhat browned; mid femur usually with 1, sometimes with 2, small *a* pre-apicals and with a row of fine somewhat unequal *pv* bristles, mid tibia with 2 strong *p* setae, hind femur with a rather dense *ad* row, in basal half with a row of short fine setulose *av* hairs, on less than apical half with 4–6 *av* setae, the last 2–3 of which are strong, some specimens of both sexes also with a row of rather fine *pv* setae, hind tibia with a small *pd* seta and at middle an *ad* and 2–3(–4) *av* setae.

Length.—5·2–8·3 mm., of wings 5·3–8·2 mm.

Distribution.—CEYLON. ASSAM. MALAYA (Pahang; Perak; Selangor; Singapore). SUMATRA. JAVA. LOMBOK. SOEMBAVA. PHILIPPINES (Mindanao; Luzon). FORMOSA (Stein det., in B.M.). QUEENSLAND (Malloch). Not occurring in the ETHIOPIAN REGION, the records concerning *D.* (*Panaga*) *fuscitibia* Stein.

The only male from Lombok and Soembava seen by Hennig has a comb of *av* setae on the fore femora like *D. pectinipes*. As one of Stein's Formosa males also shows a slight comb, Hennig considers both this and his Lombok male to belong to *apicalis* and the comb to be a character of little importance. The present account confirms that this comb is not a very fixed character. The Ceylon specimens differ slightly by the abdomen which is wholly pale and at most browned in female on median part of third and, even more rarely, posterior median part of second segment. A few specimens have been found to have no setulae on the stem-vein. Therefore the species is contained in the key twice.

188. **Dichaetomyia pilinervis** Malloch.

1928. *Dichaetomyia pilinervis* Mall., *Ent. Mitt.*, **XVII**, 317.
Type: Cameron Highlands. B.M.

Pale ferruginous with fuscous head and disc of mesonotum (at least the four undusted vittae largely fuscous); third abdominal segment and fourth, with the exception of the orange-yellow tip, piceous, first segment with a narrow piceous-brown hind margin, second with a more or less broad piceous median vitta and hind margin, which often occupy all the dorsal surface except a narrow wedge from lateral surface towards middle. Palpi dull brown to fuscous. Tarsi piceous-brown. *Head* rather densely dusted brownish-grey, parafacialia and parafrontalia silvery, facial ridges testaceous translucent; eyes practically bare; in male contiguous or almost so, interfrontalia obsolete or linear above middle, forming a very small triangle in front of ocelli and a moderately large one above lunula, parafrontalia linear, markedly dilated in anterior third, where 3–4 moderately strong inclinate setae are present, in addition with 2 tiny hairs in front of ocelli, ocellars rather weak, verticals very fine and short, but rather distinct; frons of female at vertex a quarter head-width, evenly broadened with straight sides to lunula, where it is three-tenths to a third head-width, frontal triangle

poorly defined, the slightly shining area drawn out to anterior fifth of frons, interfrontalia somewhat narrowed at extremities, more than four times as wide at middle as a parafrontale, the latter on slightly more than anterior half with 2–3 strong and 1–2 weak inclinate setae, and on outer part with a row of small proclinate black hairs, ocellars and verticals rather strong; parafacialia about a quarter, jowls half again, as wide as third antennal segment, the latter virtually reaching mouth-margin; arista long-plumose, the rays slowly decreasing in length from second fifth onward, longest rays half as long again as width of third antennal segment. *Thorax* moderately densely dusted greyish-white on disc, the dust more brownish on median *post* part, lateral and hindmost parts of mesonotum pale like scutellum; *prsc* and anterior *ia* moderately strong, *pra* rather conspicuous; anterior mesopleural weak, rarely indistinct, postalar declivity with fine pale hairs below, infrasquamal hairs present, hypopleura with fine hairs above coxa and below spiracle. *Abdomen* thinly and evenly dusted brownish-grey, rather shining; anterior three segments with conspicuous lateral marginals and short lateral discals, fourth with conspicuous lateral discals and a marginal row. *Wings* greyish subhyaline with a yellowish tinge, veins light brown and ochraceous, bare on dorsal surface except stem-vein; very slightly exceeding level of *r-m*, which lies well beyond middle of discal cell, r_{4+5} and *m* somewhat converging at apex, r_{4+5} moderately curved back and distinctly sinuous, *m* slightly upcurved at tip. Calyptrae brownish-grey subopaque with brown border and golden-brown fringe. Halteres pale reddish-yellow. *Legs:* Fore femur of male with a comb of strong short *av* setae at apex, of female with some longer *av* setulae towards apex; mid femur without a well-developed *av* comb, with a *v* seta at base and some longer half-erect *av* setulae near base, and on *pv* surface with 4–6 setae on basal half, mid tibia with 2 strong *p* setae; hind femur with an *av* row which consists of weak and short setae in more than basal half, of 3–4 strong ones near apex and of 2–3 short moderately strong ones in between, *pv* surface with a row of moderately strong setae, which in male become stronger but not longer near apex, while in female they are rather weaker, hind tibia without a distinct *pd* seta but with an *ad* and 2–3 *av* near middle.

Length.—4·7–6·4 mm., of wings 4·4–7·7 mm.

Distribution.—MALAYA: Cameron Highlands, 4,830–6,000 ft.; Fraser's Hill, Pahang, 4,000 ft. N.E. BURMA: Kambaiti.

189. **Dichaetomyia nigridorsata** sp. n.

♂ ♀: Pale ferruginous with fuscous head, disc of mesonotum piceous from neck to scutellar suture and laterally to *ph* and anterior *ia*, abdomen in male wholly pale ferruginous or somewhat browned towards apex (post-mortem ?), in female piceous except for tip of fourth segment, the first segment (apart from a narrow hind margin on median part) and a small anterolateral corner of second. Palpi fuscous, in male with yellowish tip. Tarsi and hind tibia conspicuously browned. *Head* rather densely dusted brownish-grey, facial ridges testaceous translucent; eyes virtually bare, in male subcontiguous, interfrontalia perfectly linear, except at extremities, parafrontalia linear, except in anterior two-fifths, where 4 inclinate setae are present, with 1–2 setulae near middle and a minute reclinate setula towards anterior ocellus, ocellars moderately strong, outer verticals rather weak, inner verticals weak; in female frons a quarter (0·24–0·27) head-width at vertex, evenly dilated with almost straight sides to lunula, where it is almost one-third (0·31–0·33) head-width; frontal triangle poorly defined, the slightly shining streak fading out at anterior sixth of frons, interfrontalia distinctly narrowed in front and behind, more than four times as wide at middle as a parafrontale, the latter with 2–3 strong and, alternating with them, 3–4 weak inclinate setae on anterior three-fifths and with a row of fine proclinate setulae; ocellars and verticals strong; parafacialia in male more, in female less, than a third, jowls one-and-a-quarter, width of third antennal segment, the latter not quite reaching mouth-margin; arista long-plumose, the rays becoming slowly shorter from middle onwards, longest rays almost twice as long as width of third antennal segment. *Thorax* glossy with very thin greyish-white, in male more brownish, dust, which is thick only on *prst* part between the undusted paramedian vittae; vittae otherwise hardly discernible; *prsc* rather strong, anterior *prst dc* slightly more than half as long as second, anterior *ia* not very strong, *pra* rather strong; anterior mesopleural short but usually very distinct, postalar declivity with a few pale hairs below, infrasquamal hairs present but scarce, hypopleura with a few hairs only above coxa. *Abdomen* glossy, very thinly dusted brownish-grey; anterior three segments with well-developed lateral marginals and rather weak lateral discals, fourth with conspicuous lateral discals and a row of moderately strong marginals. *Wings* subhyaline with a yellowish tinge, veins pale testaceous; stem-vein with some small curved hairs on posterior

surface, r_{4+5} with a few small hairs on basal node, veins otherwise bare on dorsal surface; r_1 slightly exceeding level of *r-m*, which lies almost at three-fifths of discal cell; r_{4+5} and *m* somewhat converging at apex, r_{4+5} somewhat curved back and sinuous, and *m* markedly upcurved at tip; *m-m* only slightly oblique and rather straight. Calyptrae greyish-ochraceous with slightly paler border and pale golden fringe. Halteres pale reddish-yellow. *Legs:* Mid femur with the usual fine *pv* seta at base, 1–3 stronger *pv* near basal third, and longer more erect *av* and *v* hairs on basal half, mid tibia with 2 strong *p* setae; hind femur with a row of fine short *av* setae in basal two-thirds, of which 2–4 in basal third are slightly longer and more erect, with 3–4 strong *av* on apical third, a very strong and rather erect *pv* at two-fifths and a few weak *pv* before and beyond the latter, hind tibia with a small *pd* seta and, at middle, an *ad* and 2 *av*.

Length.—5·6–6·0 mm., of wings 5·5–5·9 mm.

Distribution.—SIAM: Bulsit Besar, 2,500 ft., 28.VIII.01 (*H. C. Robinson* and *N. Annandale*), ♂ type, 1 ♀ paratype (in copula) (labelled '*nigridorsata* sp. n. Type' by Malloch); Talum, 26.I.02 (*H. C. Robinson* and *N. Annandale*), 1 ♂ paratype (without head). MALAYA: Fraser's Hill, Pahang, 4,200 ft., 7.VII.31 (*H. M. Pendlebury*), ♀ paratype, 4,000 ft., 27-28.I. 29, 2 ♀ paratypes (without heads and otherwise damaged); Cameron Highlands, 4,500–5,000 ft., 19.VI.35 (*H. M. Pendlebury*), 1 ♀ paratype (all in B.M.).

Rather similar to *D. heterocnemis* Emd., which also has a few hairs at the dorsal base of r_{4+5}, but which differs by much paler mesonotum in addition to the absence of hairs from the stem-vein. '*Mydaea splendida*' Stein, to which *D. nigridorsata* will be traced in Stein's key, has the lateral part of the mesonotum dark and the pleura mainly dark, the tibiae pale and the hind femora more evenly setose on *av* surface and entirely without setae on *pv* surface, and both calyptrae with blackish border.

190. **Dichaetomyia curvimedia** sp. n.

(Fig. 99)

♂ ♀: Wholly pale ferruginous except for the fuscous head and the piceous-brown tarsi. *Head* rather densely dusted brownish-grey with pale golden-dusted clypeus, facial ridges, parafacialia and parafrontalia and lower part of head somewhat ferruginous translucent; antennae orange-yellow, third segment in female largely browned; eyes almost bare, in male

closely contiguous, interfrontalia obsolete except for a very small triangle above lunula, parafrontalia linear with the anterior half slightly widened, anterior third with 1–2 strong inclinate setae and a small setula, ocellars strong, verticals small and rather indistinct; frons of female at vertex almost a quarter head-width, evenly dilated with straight or slightly concave sides to lunula where it is almost three-tenths to almost two-thirds head-width; frontal triangle poorly defined, drawn out into a slightly shining streak which reaches anterior fifth of frons, interfrontalia almost parallel-sided, less than thrice as wide at middle as a parafrontale, the latter with 2 strong and 2–3 weak inclinate setae and, on outer part, some small proclinate hairs, ocellars and verticals strong; parafacialia one-half to hardly one-third, jowls one-third

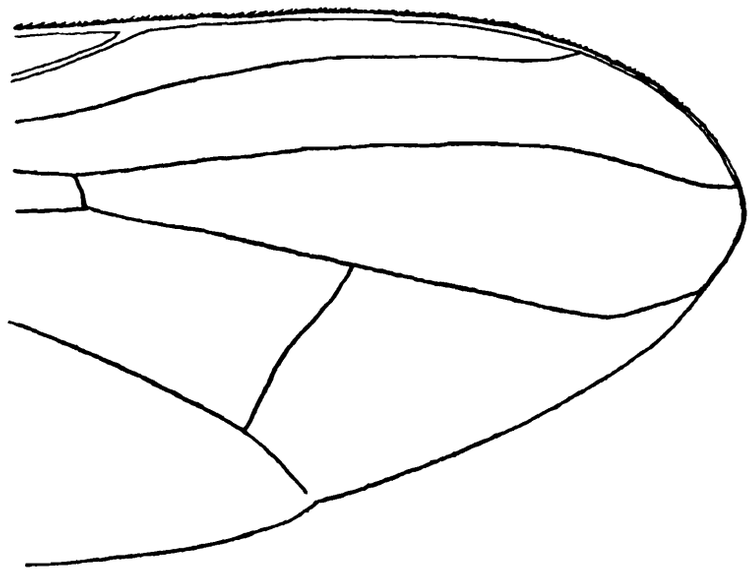


FIG. 99. *Dichaetomyia curvimedia* sp. n., apical part of wing.

again, width of third antennal segment, the latter almost reaching mouth-margin; arista long-plumose, the rays becoming gradually shorter in apical third, longest ones almost half as long again as width of third antennal segment. *Thorax* with rather thin white dust on a moderately narrow median vitta, a narrow vitta on *dc* strip, these vittae not or hardly passing suture behind, and a trace of a short narrow *post* vitta to outer side of *ia*; there is also some dust at the shoulders and a trace in front of scutellum, *prsc* rather weak, anterior *ia* and *pra* stouter, anterior *ia* slightly behind an imaginary straight line through the *sa* and first *post dc*; anterior mesopleural distinct, postalar declivity with some pale hairs, infrasquamal hairs present, some of the dark, hypopleura with some pale hairs above coxa. *Abdomen*

shining, very thinly and evenly dusted yellowish-grey, all segments with short lateral marginals and discals, fourth in female with a complete row of not very strong marginals, in male third and fourth with a complete row of rather strong marginals, fourth with the discal row also almost complete. *Wings* greyish subhyaline, slightly yellowish, especially near base, veins ochraceous, bare on dorsal surface; r_1 distinctly exceeding level of *r-m*, which lies somewhat beyond middle of discal cell in female, almost at three-fifths in male, r_{4+5} and *m* conspicuously converging at apex, r_{4+5} only slightly curved backward, somewhat sigmoid, *m* rather strongly upcurved in apical third of last section, somewhat reminiscent of *Stomoxys*; *m-m* slightly oblique and concave. Calyptrae greyish-ochraceous with pale golden fringe. Halteres pale reddish-yellow. *Legs:* Fore femur in male with a comb of 4–5 stout short setae and even in female with a subapical row of longer and stronger setulae; mid femur with similar though less differentiated *av* setulae, mid tibia with 2 strong *p* setae; hind femur with a dense row of *ad* setae, a row of short and fine rather decumbent *av* setae, which ends in male in 4–6 short and stout, and in female in 2–3 strong, pre-apicals, and with 1–2 moderately strong *pv* towards middle, hind tibia with a very small *pd* beyond apical third and 1 *ad* and 2 *av* near middle.

Length.—5·9–7·4 mm., of wings 6·8–7·8 mm.

Distribution.—CEYLON: Peradeniya, 19.VII.14 (*A. Rutherford*), ♂ type; Suduganga, 1.VI.19, in scrub (*R. W Senior White*), ♀ paratype; Matala, 22.X.19, in scrub (*R. W Senior White*), 1 ♀ paratype (all in B.M.); Bot. Gardens, Peradeniya, 21.V.53 (*F Keiser*), 1 ♂ paratype (Mus. Basle).

Very similar in colouration to *holoxantha* Emd., but that species has no femoral comb, pale palpi, darker and more conspicuous infrasquamal hairs, and *m* much less upcurved. In Stein's and Malloch's keys *curvimedia* will be traced to *pectinipes*, as which Malloch identified the type specimen, but which has the abdomen largely piceous, the fore tarsi of the female slender, and *m* much less upcurved.

191. **Dichaetomyia melanotela** sp. n.

♂: Pale ferruginous with fuscous-brown head and piceous apical two-fifths of fourth tergite, hypopygium and tarsi; antennae pale orange; mesonotum slightly darkened, dusted pale greyish-yellow, more densely so in front of suture, where four narrow brown vittae are distinct in an oblique posterior view; abdomen very thinly dusted, glossy and appearing

undusted. *Head* moderately densely dusted greyish-brown, parafacialia and parafrontalia densely dusted pale greyish-yellow, mouth-margin and facial ridges pale translucent; eyes thinly haired, closely contiguous above middle, with markedly enlarged anterior inner facets, interfrontalia obsolete in upper two-thirds, visible as a velvety fuscous-black small triangle above lunula, parafrontalia linear in upper three-fifths, slightly dilated anteriorly, where 3–4 reclinate setae are present, of which the first one is strong, the others rather weak to hair-like, in addition a small reclinate hair towards anterior ocellus, ocellars rather strong, verticals very weak but distinguishable; parafacialia linear, jowls half as wide as third antennal segment, the latter reaching mouth-margin; arista with dense long rays, which become gradually shorter from basal third onwards, longest rays fully twice as long as width of third antennal segment. *Thorax* with moderately strong *prsc* and anterior *ia*, *pra* rather small; anterior mesopleural fine (on one side of type absent), lower part of postalar declivity with fine pale hairs, infrasquamal hairs present, sparse, hypopleura with some fine pale hairs below spiracle and conspicuous dark hairs above hind coxa. *Abdomen* subcircular-subcordate, all segments with rather strong lateral discals and marginals, fourth with a marginal row, fourth ventrite with a large almost semicircular apical excision, which occupies almost its entire width, so that the short lobes are rather narrowly rounded. *Wings* greyish subhyaline, strongly yellowish-smoky towards base and front margin, veins light brown but darker brown near apex of wing, bare on dorsal surface; r_1 reaching level of *r-m*, which is rather oblique and situated at almost three-fifths of discal cell, r_{4+5} somewhat curved backward and very slightly sinuous, *m* markedly upcurved at tip, *m-m* rather strongly oblique and sinuous. Calyptrae light brown, the lower one subopaque, with testaceous border and golden fringe. Halteres pale reddish-yellow. *Legs:* Fore femur with a conspicuous pre-apical comb of short *av* setae; mid femur with the *av* and *pv* setulae only slightly longer near apex, *av*, *v* and *pv* surfaces near base with longer erect hairs, and *pv* surface near middle with 3–4 moderately strong outstanding setae, mid tibia with 2 strong *p* setae; hind femur on almost apical half with a row of *av* and *pv* setae, which are strong but rather short except for 3 near apex of *av* surface, which are long and strong, hind tibia with 1 *ad* and 2 *av* setae, the former (abnormally?) lying well beyond middle, at level of distal *av* setae.

Length.—6·4 mm., of wings 6·7 mm.

Distribution.—CEYLON: Ratnapura, Sab., 9.X.53 (*F. Keiser*), ♂ type (Mus. Basle).

192. Dichaetomyia latistriata Malloch.

(Fig. 100)

1925. *Dichaetomyia latistriata* Mall., *Ann. Mag. n. H.*, (9) XV, p. 136, ♂. Type: Kuala Tahan. B.M.

Pale testaceous with fuscous head, yellowish-orange antennae and, in male, palpi, a broad piceous vitta extending from half-way between median line and *dc* to *ph*, usually *prst*, and the *ia* on each side of mesonotum, and with part of the abdomen piceous-black, the tip, however, orange-yellow; hind tibia somewhat browned, tarsi piceous. *Head* rather densely dusted brownish-grey, parafacialia and parafrontalia dusted silver-white with pale golden sheen; facial ridges dull yellowish translucent; eyes practically bare, in male contiguous or

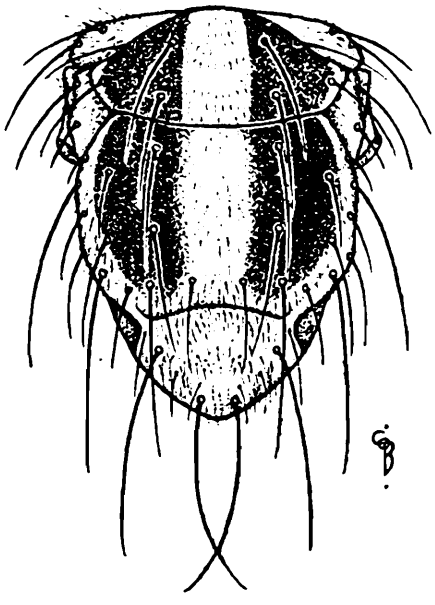


FIG. 100. *Dichaetomyia latistriata* Mall., dorsal view of thorax.

practically so, interfrontalia obsolete or finely linear on more than upper half but visible as a rather small triangle above lunula, parafrontalia linear, somewhat dilated below, where 3–5 rather strong inclinate setae are present, upper part with 2 small proclinate hairs near anterior ocellus, ocellars strong, verticals weak but quite conspicuous; frons of female almost a quarter head-width at vertex, evenly dilated with straight sides to lunula, where it is three-tenths head-width, frontal triangle poorly defined, slightly shining, gradually

fading out towards lunula, interfrontalia somewhat narrowed at extremities, more than thrice as wide at middle as a parafrontale, the latter with 3 rather strong and 1–2 weak inclinate setae on slightly more than anterior half, anterior reclinate seta weak, ocellars and verticals strong; parafacialia almost linear, about a fifth, jowls subequal to, width of third antennal segment, the latter almost or quite reaching mouth-margin; arista with dense long rays, which become slowly shorter from middle onwards, longest rays in male twice, in female two-thirds again, as long as width of third antennal segment. *Thorax* with a whitish-dusted median vitta and whitish dust on shoulders and sides; *prsc* and anterior *ia* moderately strong, *pra* somewhat shorter but not thinner; anterior mesopleural conspicuous, postalar declivity with rather numerous pale hairs, infrasquamal hairs present, hypopleura with pale hairs both above coxa and below spiracle. *Abdomen* with the first segment wholly pale, its hind margin seldom narrowly piceous, second segment in male without or with a median suffusion, in female piceous with a narrow pale fore margin on lateral part, third segment piceous, laterally with a fore margin which is broader or narrower in male and very reduced or absent in female, fourth segment with an orange-yellow tip and a large transverse piceous spot, which may be reduced to a broad V, the base of the segment in this case being narrowly pale except on median part, or which may occupy all or almost all the rest of the segment; all segments with rather conspicuous lateral discals and marginals, fourth with a complete marginal row. *Wings* ochraceous-grey subhyaline, somewhat more rusty-yellow towards base and along the veins; the latter dark ochraceous to light brown, bare on dorsal surface, r_1 reaching level of *r-m*, which lies beyond middle of discal cell, r_{4+5} and *m* somewhat converging at apex, r_{4+5} moderately curved back and slightly sinuous, *m* markedly upcurved at tip; *m-m* in male rather strongly oblique and sinuous, in female slightly so. Calyptrae brownish-grey with pale ochraceous or pale brownish border and pale golden fringe. Halteres pale reddish-yellow. *Legs* of male with a pre-apical comb of short strong *av* setae on all femora, the setae being less numerous on hind femur, in female the fore femur with a few conspicuously stronger *av* setulae in the place of the comb, the mid femur with indistinctly longer hairs, the hind femur with some pre-apical *av* setae, the most distal ones of which are longer and stronger; mid femur with a row of fine *pv* setae from base to beyond middle where they gradually become shorter and finer, mid tibia with 2 strong *p* setae, hind femur

with 3–4 fine *pv* setae, hind tibia with a very small *pd* seta beyond middle and an *ad* and (2–)3 *av* near middle.

Length.—7·3 (♀)–11·0 mm., of wings 7·1–10·9 mm.

Distribution.—MALAYA: Kuala Tahan, 3,000 ft., Pahang; Cameron Highlands, 4,500–5,000 ft., Pahang; Kedah Peak, 2,000–3,300 ft. (*H. M. Pendlebury*). N. BORNEO: Bettotan nr. Sandakan (*C. Boden Kloss* and *H. M. Pendlebury*).

The larger measurements refer to the Sandakan male, the male from Malaya being about 9 mm. long.

193. **Dichaetomyia pectinipes** (Stein).

(Fig. 98*a*)

1909. *Mydaea pectinipes* Stein, *Tijdschr. Ent.*, **LII**, 225, 230; 1915, *Suppl. ent.*, **IV**, 23; 1918, *Ann. Mus. n. Hungar.*, **XVI**, 153, 182. Type: Buitenzorg. Mus. Amsterdam.

1925. *Dichaetomyia pectinipes* (Stein), Mall., *Ann. Mag. n. H.*, (9) **XV**, 138; 1925, *Philipp. J. Sci.*, **XXVI**, 322, 323.

1927. *Lophomala pectinipes* (Stein), End., *Konowia*, **VI**, 55 (*rectinipes* err. typ.).

Pale ferruginous with the mesonotum more or less browned, the region of the *prst dc* sometimes infuscated, the head fuscous, the fourth and most or all of third abdominal segment piceous, this colouration in female and some males extending forward to posterior part of first segment, tarsi and hind tibia somewhat browned. Antennae orange-yellow, third segment somewhat browned in female. *Head* rather densely dusted brownish, clypeus, parafacialia and parafrontalia dusted silver-white with a pale golden tinge, facial ridges pale translucent; eyes bare, in male contiguous, the inner facets distinctly enlarged, interfrontalia reduced to a small triangle above lunula, parafacialia very narrow, somewhat dilated to lunula, with 1 strong and 2–4 gradually much weaker inclinate setae on slightly more than anterior third and a small proclinate hair at upper third, ocellars moderately strong, verticals weak; frons of female almost a quarter head-width at vertex, evenly dilated with hardly concave sides to lunula, where it is almost three-tenths head-width, frontal triangle poorly defined, somewhat shining, fading out near anterior sixth of frons, interfrontalia somewhat narrowed anteriorly, 4–5 times as wide at middle as a parafrontale, the latter with 2 strong and 2–3 small inclinate setae, anterior reclinate seta very weak, outer part with a few scattered proclinate hairs, ocellars and verticals strong; parafacialia about a quarter, jowls in male of slightly more, in female of slightly less, than

width of third antennal segment,[1] the latter reaching or almost reaching mouth-margin; arista long-plumose, the rays becoming slowly shorter from middle onwards, longest rays almost two-thirds as long again as width of third antennal segment. *Thorax* with the beginning of three greyish-white dusted vittae, the median one more whitish above neck, vittae not or hardly visible behind suture; *prsc* and anterior *ia* well developed, subequal, *pra* rather short but quite strong; anterior mesopleural rather fine but distinct, postalar declivity with rather numerous pale hairs, infrasquamal hairs present, hypopleura with hairs above coxa and some very fine pale ones, which are difficult to see, below spiracle. *Abdomen* evenly and very thinly dusted brownish-grey, the segments with well-developed lateral marginals and discals, fourth with a complete row of not very strong marginals. *Wings* subhyaline, rather strongly tinged ochraceous, especially on anterior basal part, veins light brown with somewhat ochraceous bases, bare on dorsal surface; r_1 reaching or slightly exceeding level of *r-m*, the latter at almost two-thirds or at least well beyond middle (♀, some males) of discal cell, r_{4+5} and *m* somewhat converging at apex, r_{4+5} being slightly curved backward and very shallowly sinuous, *m* being slightly but distinctly upcurved at tip; *m-m* somewhat oblique and sinuous in male, very slightly so in female. Calyptrae pale greyish-brown with pale border and golden fringe. Halteres dull reddish-yellow. *Legs:* Mid femur in female with the *pv* hairs only slightly longer, in male with about 6 well-developed *pv* setae on middle half, mid tibia with 2 strong *p* setae; hind femur with an *av* row of short setae ending in 2–3 strong *av* pre-apicals, *pv* surface in male with 3–6 not very strong setae from basal third to beyond middle and 4–6 short strong setae on apical part, hind tibia with a small *pd*, an *ad* and (2–)3(–4) *av* setae.

Length.—6·2–8·6 mm., of wings 6·7–8·0 mm.

Distribution.—INDIA: Valparai, from cardamom stems. MALAYA: Larut Hills, 3,700–4,500 m., Perak, 2♂ 2♀ (on which the description is based); Fraser's Hill, 4,200 ft., Pahang, 1♀ JAVA (typical locality). FORMOSA (Stein). PHILIPPINES: Luzon (Malloch).

A female mentioned by Malloch (1925) from the Cameron Highlands has the fore tarsi dilated, the abdomen largely piceous (including tip), and *m* weakly upcurved; the fore

[1] The third antennal segment being normally narrower in the males of this genus than in the females.

femora have some conspicuous *av* setulae towards apex. This specimen is almost certainly neither *pectinipes* nor *curvimedia*, though intermediate between both, and I cannot associate it with any other species, but it is hardly desirable to name and describe this single specimen. One of the two Malayan males has *r-m* not much beyond middle of discal cell, the parafrontalia perfectly linear, the second abdominal segment almost wholly piceous, and the hind tibia not browned, and one of the Malayan females shows a row of *pv* setae on the hind femur, as described for the male, and the hind tibia quite pale. In both these specimens the thorax is less darkened on and lateral of the line of the *prst dc*. They fit Stein's description less well and may be a separate species. It is more probable, however, that they are only variations of *pectinipes*.

194. **Dichaetomyia pahangensis** Malloch.

(Fig. 101)

1925. *Dichaetomyia pahangensis* Mall., *Ann. Mag. n. H.*, (9) XV, 137, ♂. Type: Gunong Tahan, Padang, Malaya. B.M.

Pale ferruginous; head fuscous; antennae yellowish-orange with slightly browned third segment; palpi brown (in female often yellow); tarsi piceous, base of abdomen pale ferruginous and tip orange-yellow, and disc of abdomen piceous. *Head* with rather dense brownish-grey dust, clypeus dusted silver-grey and parafacialia and parafrontalia silver-white; eyes rather thinly short-haired in male, closely contiguous, interfrontalia reduced to a minute triangle in front of ocellar tubercle and to a larger one above lunula, parafrontalia linear, slightly wider in front where one strong and 3–4 weak inclinate setae are present, in addition with 2 small reclinate hairs in front of ocelli, ocellars not very strong, verticals very weak but distinguishable; eyes of female practically bare, separated at vertex by a quarter to almost three-tenths (0·24–0·29) head-width, frons evenly dilated with almost straight sides to lunula, where it is three-tenths to a third (0·29–0·33) head-width, frontal triangle poorly defined, indefinitely extended from middle to anterior fifth of frons, interfrontalia slightly narrowed at extremities, about four times as wide at middle as a parafrontale, the latter with 2 strong (the upper one near middle) and 3–4 small inclinate setae, outer part with a few proclinate black setulae, ocellars and verticals strong; parafacialia a fourth, jowls equal to, width of third antennal segment, the latter almost or fully

reaching mouth-margin; arista long-plumose, rays becoming gradually shorter from middle onwards, longest ones a third longer than width of third antennal segment. Palpi of female more or less strongly dilated. *Thorax* in male and in some females with a broad piceous-brown median vitta, in other specimens more extensively darkened with four undusted dark vittae, median vitta rather densely dusted grey, in male yellowish-grey, especially in front of suture, some pale dust also on the *dc* strip, especially in female, and on

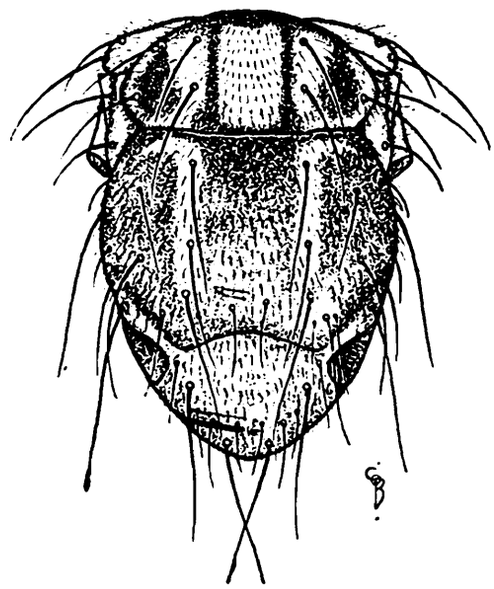


FIG. 101. *Dichaetomyia pahangensis* Mall., dorsal view of thorax with typical pattern.

shoulders; *prsc* and anterior *ia* moderately strong, *pra* conspicuous though shorter than second *npl*, anterior mesopleural distinct, dark infrasquamal hairs and pale hairs on postalar declivity rather numerous, hypopleura with hairs above coxa and finer ones below spiracle. *Abdomen* thinly and evenly dusted brownish-grey, shining, setae as in *pectinipes*, but marginal row of third tergite often almost complete. *Wings* brownish subhyaline, markedly yellowish towards base, veins light brown with ochraceous bases, bare on dorsal surface; r_1 slightly exceeding level of *r-m*, the latter in male at almost three-fifths, in female somewhat beyond middle, of discal cell, r_{4+5} and *m* converging at apex, r_{4+5} moderately curved backward and sinuous, *m* markedly upcurved at tip, *m-m* somewhat sinuous, in male rather strongly oblique. Calyptrae brownish-grey subopaque with somewhat paler border, sometimes browned towards border, fringe golden. Halteres reddish-yellow. *Legs* rather slender, with slender tarsi in both sexes; mid femur in male and some

females with a row of *pv* setae from base to beyond middle, mid tibia with 2 strong *p* setae; hind femur evenly covered with decumbent hairs on basal three-fifths of *v* surfaces, in females sometimes with 1–2 *av* setae among them, the apical third or two-fifths in male with a comb-like row of short and strong *av* and *pv* setae, in female the *av* setae less numerous and much longer and the *pv* ones only more or less distinctly indicated by slightly longer hairs, hind tibia with an *ad* and (2–)3–4 *av* setae.

Length.—5·6–8·8 mm., of wings 5·9–9·4 mm.

Distribution.—MALAYA (Pahang: Fraser's Hill; Gunong Tahan, Padang; Gunong Benom; Cameron Highlands; Perak: Larut Hills; Kedah Peak; Selangor: Bukit Kutu), 3,300–6,000 ft. PENINSULAR SIAM: Nakon Sri Tamarat, Khao Luang, 2,000 ft. N.E. BURMA: Kambaiti, 2,000 m. CEYLON: Kandy.

The only specimen from Ceylon, a male with the distinctive *pv* bristles of the hind femora, has the mesonotum extensively infuscated like some females from Pahang and Selangor. In addition the anterior two abdominal segments and the antero-lateral part of the third are wholly pale, whereas the disc is less extensively darkened than in all other specimens.

195. **Dichaetomyia pendleburyi** Malloch.

(Fig. 102)

1925. *Dichaetomyia pendleburyi* Mall., *Ann. Mag. n. H.*, (9) **XV**, 138. Type: Wray's Camp, Pahang. B.M.

Pale ferruginous with fuscous head, darker ferruginous mesonotum with four more or less brown suffused vittae, the paramedian one sometimes coalescing behind suture, apex of fourth tergite orange-yellow, rest of fourth, all of third and at least hind margin of second tergite piceous, base of third tergite sometimes paler on each side; antennae and usually palpi orange-yellow. Legs pale testaceous, tarsi in male browned, in female piceous. *Head* dusted brownish-grey, facial ridges pale testaceous translucent, parafacialia and parafrontalia dusted somewhat yellowish-silver; eyes almost bare, in male contiguous with markedly enlarged anterior facets, interfrontalia obsolete or practically obsolete on more than upper half and forming a small fuscous triangle above lunula, parafrontalia linear, slightly broadened at lunula, where 3 inclinate setae are present, the posterior two short, reclinate hairs absent, ocellars strong, verticals fine but distinct; frons of female a quarter head-width or a little wider

(0·25–0·27) at vertex, almost evenly dilated to lunula, where it is about a third (0·31–0·34) head-width, frontal triangle poorly defined, slightly shining, disappearing near middle, interfrontalia slightly narrowed at extremities, 4–5 times as wide at middle as a parafrontale, the latter with a strong, 1–2 moderately strong and 2–3 weak inclinate setae on more than anterior half, outer part with a few black proclinate setulae, ocellars and verticals strong; parafacialia a third, jowls equal to, width of third antennal segment, the latter falling short of mouth-margin by almost half its own width; arista long-plumose, rays becoming slowly shorter from third, fifth onwards, longest rays half again (♀) to almost twice (♂) as long as width of third antennal segment. Palpi somewhat compressed and broadened near apex, especially in female. *Thorax* with a moderately broad white-dusted median vitta and a narrower dusted vitta on the *dc* strip, vittae becoming

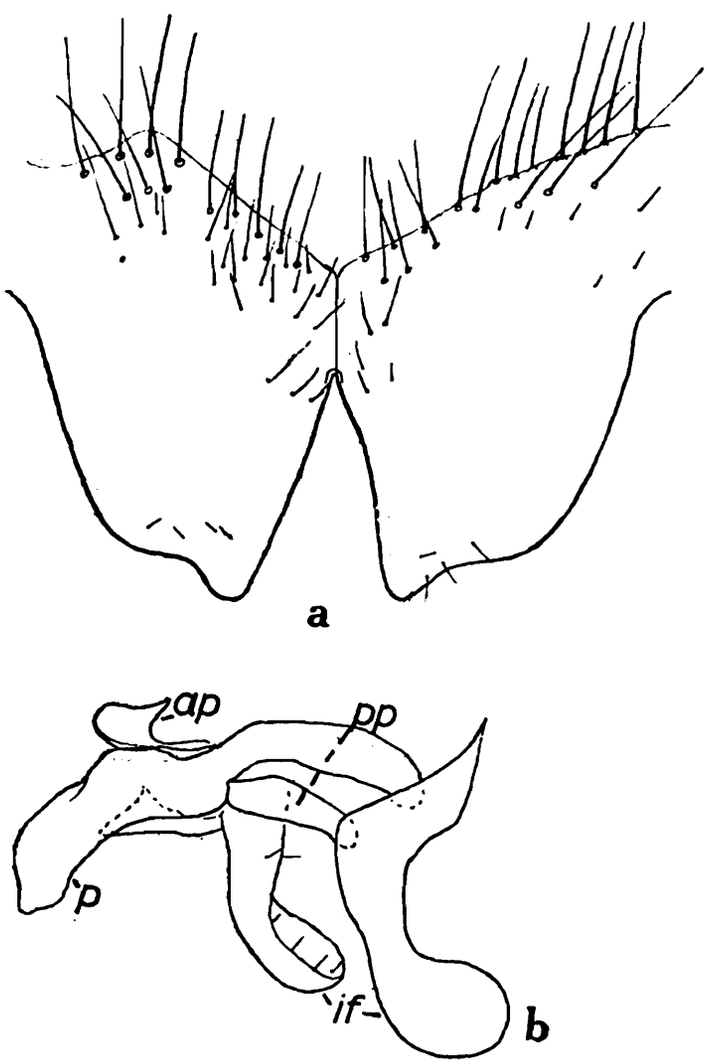


FIG. 102. *Dichaetomyia pendleburyi* Mall., male genitalia. (*a*) superior forceps; (*b*) inferior forceps and penis. *ap*, anterior paramere; *if*, inferior forceps; *p*, penis; *pp*, posterior paramere.

much fainter behind suture, especially in male, the undusted brown paramedian vittae becoming broader towards and behind suture, especially in female, outer brown vittae broad, narrowly interrupted at suture; *prsc* and anterior *ia* moderately strong, *pra* conspicuous; anterior mesopleural distinct, postalar declivity with some pale hairs, infrasquamal hairs present, dark, hypopleura with some hairs above coxa and some very small ones below spiracle. *Abdomen* shining, with very thin and even brown-grey dust; setae as in *pectinipes*. *Wings* greyish subhyaline with a slight yellowish tinge, veins light brown with ochraceous-brown bases, bare on dorsal surface; r_1 slightly exceeding level of *r-m*, which lies well beyond middle of discal cell, r_{4+5} and *m* somewhat converging at apex, r_{4+5} somewhat curved back and conspicuously sinuous, *m* markedly upcurved at tip, *m-m* rather strongly oblique and sinuous. Calyptrae brownish-grey subopaque, with brownish border and golden fringe. Halteres dull reddish-yellow. *Legs* of male with slender tarsi, of female with slender posterior but distinctly incrassate fore tarsi, apex of fore femur of male normally with a comb of short strong *av* setae, which in female are often indicated by smaller setae or at least more strongly developed setulae; mid femur with 5–7 fine *pv* setae on more than basal half, near apex of *av* surface with a few stronger or at least slightly longer setulae, mid tibia with 2 strong *p* setae; hind femur on more than basal half of *av* surface with only somewhat longer half-erect setulae, which become stronger beyond middle, the row being continued to apex by some strong setae, *pv* surface in male with a row of 3–8 rather short setae on middle half, in female with longer more widely spaced setae from base to beyond middle, this row being continued to apex by somewhat longer semi-decumbent setulae, hind tibia with an *ad* and 2–4 *av* setae.

Length.—5·2–8·5 mm., of wings 5·8–8·9 mm.

Distribution.—INDIA (Darjeeling; Assam: Khasi Hills). N.E. BURMA (Kambaiti, 2,300 m.). MALAYA (Pahang: Wray's Camp; Gunong Benom, Cameron Highlands).

Genus 31. **Tamilomyia** gen. n.

Head with short-haired eyes; female without cruciate interfrontal and proclinate orbital setae and with the anterior of the two reclinate setae the weaker; frontal triangle not very conspicuous or large; arista long-plumose. *Thorax* with 0+1 *acr*, 2+4 *dc*, 2 *ia*, 3 postalars; anterior mesopleural and auxiliary prostigmal present, 1+2 *stpl*, the lower posterior

one at the apex of a moderately obtuse triangle; the other setae as usual; prosternum, propleural depression and pteropleura bare as is the hypopleura except for the embossed upper anterior part, which bears conspicuous dark hairs; lower margin of metathoracic spiracle with a complete row of black setulose hairs. *Abdomen* short-ovate, without any strong setae; ventro-basal scale quite bare. *Wings* with *sc* markedly sinuate beyond *h*, apical part strongly upcurved; veins (except *c*) without setulae on dorsal and ventral surfaces; *m* slightly upcurved at tip. Lower calyptra of *Phaonia* type. *Legs* moderately slender; mid femur with an *a* pre-apical, mid tibia without *ad*, *av* or *pv* setae; hind tibia with a very small (rather indistinct) *pd* seta and a well-developed *ad* pre-apical.

Genotype.—T dichaetomyiina sp. n.

Distribution.—So far only known from CEYLON.

Very similar and certainly closely related to *Dichaetomyia*. The male is unknown.

196. **Tamilomyia dichaetomyiina** sp. n.

♀ : Pale ferruginous with fuscous head and rufous-brown dorsal surface of second (except for anterior angles), third and probably fourth abdominal segments, but fourth segment broadly pale ferruginous along median line; antennae pale orange, apical two-thirds of third segment somewhat browned; palpi, proboscis and tarsi pale ferruginous, somewhat browned. *Head* moderately densely dusted pale brownish-grey, parafacialia and parafrontalia more silver-grey, facial ridges pale translucent; eyes with rather dense very short hair, in male presumably with longer hair; frons at vertex a quarter head-width, slightly dilated with hardly concave sides to lunula where it is almost three-tenths head-width, frontal triangle fading out towards middle, slightly shining, interfrontalia in certain views rather densely dusted pale brownish-grey, somewhat narrowed extremities, four times as wide at middle as a parafrontale; the latter with a strong inclinate seta in front and another at middle and 2–3 very small ones between and another above them, anterior outer part with a row of 2–3 proclinate black setulae, ocellars and verticals strong; parafacialia practically obsolete at middle if viewed in profile, in anterior view not quite half as wide, jowls fully as wide, as third antennal segment, the latter reaching mouth-margin; arista long-plumose, rays gradually becoming shorter from middle onwards, longest rays almost twice as long as width of third antennal segment. *Thorax*

with only traces of whitish dust along the *prst dc*, outward of the *ia* and along lateral part of suture, shoulder region somewhat more conspicuously dusted, underside of scutellum with a suffused brown median vitta which extends to apex, so that the tip between the apical setae is suffusedly brown; *prsc* rather weak, the other setae including the *ia* and *pra* more or less strong, *pra* stronger than second *npl*, anterior *ia* not much in front of level of second *post dc*; underside and lateral surface of scutellum bare (except for 1–2 hairs just below level of setae), postalar declivity bare. *Abdomen* very thinly but evenly dusted, the dust pale grey on the light parts and brown on the dark; anterior two segments with small lateral marginals, third with stronger ones and with distinct lateral discals, fourth with rather strong lateral discals and a row of marginals. *Wings* yellowish subhyaline with pale testaceous veins; r_1 slightly exceeding level of *r-m*, which lies a short distance beyond middle of discal cell, r_{4+5} considerably curved backward and slightly sinuous at apex, *m-m* somewhat oblique and outwardly concave. Lower calyptra greyish-brown subopaque with concolorous border and golden fringe. Halteres pale reddish-yellow. *Legs* without submedian setae on anterior tibiae except for 3–4 *p* setae on the middle tibia; mid femur without outstanding setae except for the small *a* pre-apical and the 3 *p* to *pd* pre-apicals, but basal third of *v* surface with a row of longer half-erect setulae; hind femur with 5–6 *av* setae on apical half and a complete row of small and fine *pv* setae, hind tibia with 2 *ad* and 3 *av* setae at and beyond middle.

Length.—6·3 mm., of wings 6·3 mm.

Distribution.—CEYLON: Peradeniya, 18.V.14 (*A. Rutherford*), ♀ type (B.M.).

Tribe MYDAEINI

The hind tibia is without the *pd* seta near apical third typical of the Phaoniini, and with a distinct *ad* pre-apical, except in subg. *Hebecnema*, where this is often indistinct or small as in Limnophorini. In *Hebecnema* and in almost all the other Mydaeini the mid femur has a distinct *a* pre-apical.[1] Pteropleura always bare in Oriental forms.[2]

---

[1] Hind tibia without an *ad* pre-apical, and mid femur without an *a* pre-apical. See *Spilogona abnormis* Stein.

[2] If the pteropleura is setulose, see *Rhynchomydaea* (Phaoniini), which has only a weak *pd* near apical third of hind tibia. The face has a prominent nose-like keel on upper half. Hind tibia without an *ad* pre-apical, and mid femur without an *a* pre-apical. *m* strongly upcurved.

The tribe contains large numbers of species in all regions.

Key to the Genera of MYDAEINI

1	(4) Prosternum setulose, and r_{4+5} more or less setulose above and below, r_1 often setulose on dorsal surface.	
2	(3) Inner margin of lower calyptra adjacent to margin of scutellum for some distance; apical margin rounded-truncate	*Xenosia* Mall., p. 428
3	(2) Inner margin of lower calyptra diverging from margin of scutellum from basis onwards; apical margin strongly rounded. .	*Xenosina* Mall., p. 433
4	(1) Prosternum bare or, if it is setulose, r_{4+5} entirely bare above and below. Dorsal surface of r_1 never setulose.	
5	(6) Node at base of r_{4+5} setulose on both dorsal and ventral surfaces. *pra* present, seldom indistinct.	*Mydaea* R.-D., p. 468
6	(5) Node at base of r_{4+5} bare at least on dorsal surface (in some *Hebecnema* some minute hairs are present, in these species the *pra* absent, 4 *post dc* present, and *ad* pre-apical of hind tibia shorter than tibial diameter).	*Helina* R.-D., p. 493

Genus 32. **Xenosia** Malloch.

1921. *Xenosia* Mall., *Ann. Mag. n. H.*, (9) **VII**, 421; 1922, *Ibid.*, (9) **X**, 573; Séguy, 1937, *Gen. Ins. fasc.*, **205**, 377. Genotype: *ungulata* Stein (= *bina* Wied.).

Head: Eyes moderately approximated in male, widely separated in female, almost bare; cruciate interfrontal setae absent; inclinate frontals becoming weaker above but forming a continuous row with the reclinate setae; these small but well differentiated one in male, two in female, parafrontalia otherwise bare in male, with a row of small setulae in female; ocellars rather strong; verticals indistinct in male, strong in female; third antennal segment about twice as long as second; arista plumose, longest hairs twice, in male more than twice, as long as width of third antennal segment. *Thorax* with 0+1 *acr*, 2+4 strong *dc*, 0+1 *ia*, which is strong, 1 posthumeral, 1 *prst*, a small *pra*, 2 *sa*, 2 postalars, 2–3 humerals, 2 notopleurals; propleural and prostigmal present, 2 anterior mesopleurals, 2+2 *stpl*, the anterior lower one very small; scutellum in male almost as long as wide, with two

pairs of strong marginals, a pair of weak basal marginals and 1–2 small setae near apical part of margin; sides bare below level of setae. Prosternum setulose, propleural depression and pteropleura bare, hypopleura with a few hairs above and below; postalar declivity, suprasquamal ridge and surface of calyptrae bare. *Abdomen* with median and lateral marginals on third and a row of discals and marginals on fourth segment; male hypopygium inconspicuous. *Wings* with evenly hairy membrane; basal part of r_{4+5} and usually dorsal surface of r_1 setulose, *m* broadly curved forward and somewhat sinuous apically, R_5 rather broadly open at apex. *Legs* slender, mid femur without an *a* pre-apical, with two strong and 1–2 small *p* to *pd* pre-apicals, mid tibia without submedian setae, except for two small *p* ones, hind tibia without *pd* and *pv* setae, normally with two small *ad* and two small approximated *av* setae.

Distribution.—ORIENTAL REGION.

Biology.—Muirhead Thomson (1947, *Proc. R. ent. Soc. London*, (A) **XXII**, 96) described the egg and larva. The larval spiracles are figured with straight slits, the outer end of the upper slit being bent up. A number of puparia from Ceylon have the slits much narrower and somewhat meandering (Fig. 11 K), thus emphasizing the transitional position of the genus. Possibly, Thomson's specimens from Assam, which were identified by me as *X. ungulata* Stein, belonged in reality to *X. steini*. The eggs (Fig. 8 v) are laid singly at the edge of cow-dung; the emerging larva is a second instar; and the buccopharyngeal armature (Fig. 10 i) is of the carnivorous type. Specimens seen by me were bred from cow-dung in the field or found in or near cattle sheds.

Malloch's (1922) modification of the generic diagnosis has been revoked by him (1925) including *morosa* in *Xenosina*. Séguy amalgamated the latter genus again with *Xenosia*.

Key to the Species of XENOSIA

1	(2)	Fore tibia with a *p* seta. Coxae testaceous. Thoracic vittae only indicated, slightly darker grey. Second tergite without brown-dusted spots. ♂: Frons almost one-fifth head-width. ...	*steini* sp. n., p. 430
2	(1)	Fore tibia without a *p* seta. All coxae fuscous or strongly infuscated	*bina* (Wied.), pp. 432, 433
3	(4)	Mid and hind femora and third antennal segment wholly pale testaceous. Thoracic vittae only	

		indicated, slightly darker grey. Second tergite of male with, of female without, a pair of distinct or faint small brown-dusted spots (analogous to those at base of median marginals of third tergite). ♂: Frons one-tenth head-width.	*bina bina* (Wied.).
4	(3)	♂: Mid and usually hind femora browned on basal half, fore femora largely browned, third antennal segment brown except at base. Thoracic vittae conspicuous, blackish. Second and third tergites each with a pair of conspicuous small brown-dusted spots near middle of hind margin. Frons almost one-sixth to one-seventh head-width. . ..	*bina brunneifemorata* ssp. n., p. 433

197. **Xenosia steini** sp. n.

(Fig. 103)

♂ ♀: Black with rather dense silver-grey dust and pale testaceous antennae, palpi and legs, including coxae; tip of fourth abdominal segment and of scutellum yellowish translucent. *Head* with the face dusted silver-white and the interfrontalia dusted grey; frons of male almost parallel-sided in upper half, almost one-fifth head-width, moderately dilated anteriorly, interfrontalia almost parallel-sided, 3–4 times width of a parafrontale at middle; frons of female at vertex three-tenths

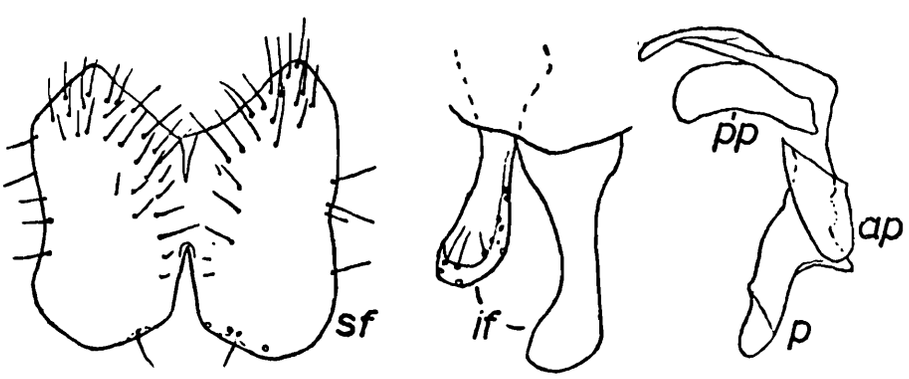


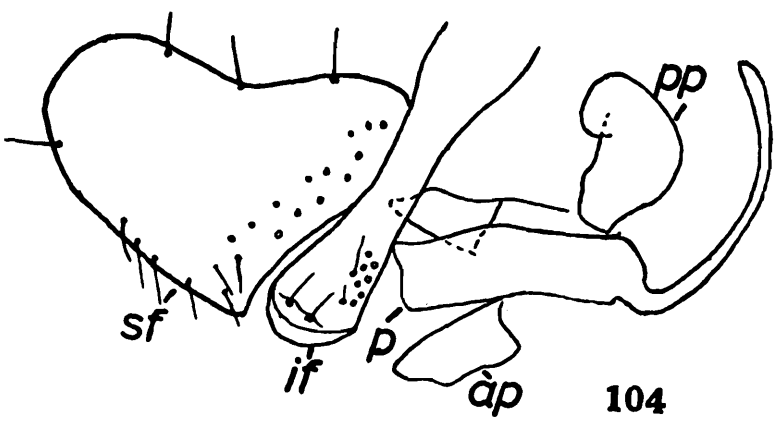
FIG. 103. *Xenosia steini* sp. n., male genitalia. *ap*, anterior paramere; *if*, inferior forceps; *p*, penis; *pp*, posterior paramere; *sf*, superior forceps.

head-width, rather strongly and evenly dilated to lunula where it is more than a third head-width. *Thorax* with two or four vittae indicated by somewhat thinner dust, somewhat darker grey, especially in female. *Abdomen* dusted uniformly

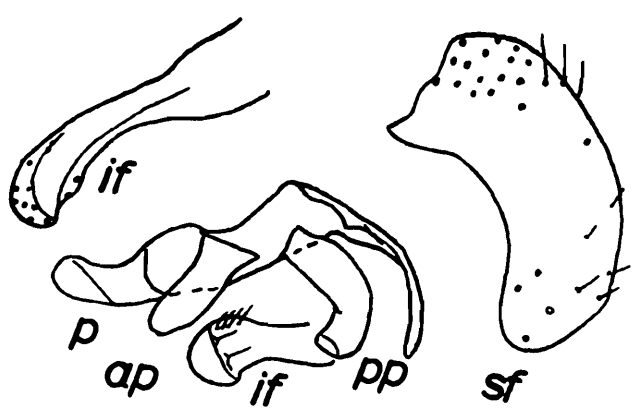
grey, second segment without, third with, small brown dots at the base of the median marginals, the base of the other strong setae of the third and fourth segments often with less conspicuous brown dots. *Wings* with *m* only moderately upcurved at apex and slightly sinuous. *Legs*: Fore tibia with a small but conspicuous *p* seta at middle. For ♂ genitalia *see* Fig. 103.

Length.—5·8–8·1 mm., of wings 5·1–7·3 mm.

Distribution.—INDIA: Bengal, Calcutta, 20–28.VI.08 (*E. Brunetti*), ♂ type, 1 ♀ paratype; 3.X.12, 1 ♂ paratype, XI.08, 1 ♂, 2 ♀ paratypes, 1–10.VIII.08, 2 ♀ paratypes, VII.1913, 1 ♀ paratype, 20–30.XII.08, 1 ♀ paratype, 14.VIII.04, 1 ♀ paratype; Kalighat (near Calcutta), 17 VIII.04 (*E. Brunetti*), 2 ♀ paratypes; Tollygunge (S. of Calcutta), 14.VIII.04 (*E. Brunetti*), 2 ♀ paratypes, 26.IX.04, 2 ♀ paratypes,—all in B.M.; N. Bengal, Katihar, Purneah Dist., 18.III.09 (*C. Paiva*), 1 ♀ paratype, 23.III.09, 1 ♀ paratype, in Ind. Mus., Calcutta;



104



105

FIG. 104. *Xenosia bina* (Wied.), male genitalia.

FIG. 105. *Xenosia bina brunneifemorata* ssp. n., male genitalia. *ap*, anterior paramere; *if*, inferior forceps; *p*, penis; *pp*, posterior paramere; *sf*, superior forceps.

Bombay, Poona Dist., Lonauli, III.1902 (*Biro*), 1 paratype in B.M.

In describing *S. ungulata* (1909, 234) Stein mentioned a male from Lonauli, the fore tibiae of which carried a *p* seta, the first case of inconsistency of this seta in his experience. In 1915 (*Suppl. ent.*, **IV**, 25) he considered it possible that the Lonauli specimen represents a good species, since no other case of inconsistency of this seta had occurred, and because the frons of the Lonauli specimen is considerably wider. In 1918 (*Ann. Mus. nat. Hungar.*, **XVI**, 173) he mentioned specimens collected by Brunetti at Calcutta and Mussoorie, the former differing from the type only by the presence of a seta on the fore tibia. However, Calcutta specimens collected by Brunetti have also the wider frons of the Lonauli form. Stein's view of 1915 was therefore obviously the correct one, and the species is dedicated to the memory of this great student of Calyptrate Diptera.

198*a*. **Xenosia bina** (Wiedemann).

(Fig. 104, Pl. 2, fig. 11)

1830. ! *Anthomyia bina* Wied., *Aussereur. zweifl. Ins.*, **II**, 426. Type: China. Mus. Copenhagen.

1909. *Mydaea ungulata* Stein, *Tijdschr. Ent.*, **LII**, 233; 1915, *Suppl. ent.*, **IV**, 25; 1918, *Ann. Mus. nat. Hungar.*, **XVI**, 154, 173. Types: Java, Semarang. Mus. Amsterdam (n. syn.).

1921. *Xenosia ungulata* (Stein), Mall., *Ann. Mag. n. H.*, (9) **VII**, 422; 1922, *Ibid.*, (9) **X**, 574.

Black with rather dense grey, in places somewhat greenish- or bluish-grey dust and pale testaceous antennae, palpi and legs; coxae largely, basal half of fore femora often, infuscated; tip of fourth abdominal segment and of scutellum yellowish translucent. *Head* with the face and anterior part of parafrontalia dusted silver-white, interfrontalia fuscous-black with only slight grey reflections; frons of male with concave sides, narrowest just behind middle, where it is one-tenth head-width, and as wide to twice as wide as a parafrontale, slightly dilated to lunula; frons of female at vertex over a quarter to nearly a third head-width, only slightly wider at lunula, the sides just noticeably convex. *Thorax* with the four vittae slightly more distinct than in *steini* and often overlaid with somewhat brownish dust. *Abdomen* in male with a pair of small brown spots near hind margin of second and third segments, those of the third at the base of the median marginals, female sometimes with a vestige of these

spots. *Wings* with the apical part of *m* more strongly upcurved and sinuous than in *steini*. *Legs:* Fore tibia without a seta near middle. For ♂ genitalia *see* Fig. 104.

Length.—5·7–7·8 mm., of wings 5·2–7·3 mm.

Distribution.—CEYLON. INDIA (Palni Hills, S. India; Simla Hills; Sikkim; Bengal; Bihar). BURMA. MALAYA. JAVA (Types). SUMATRA. PHILIPPINES. S. CHINA: Hong Kong. FORMOSA.

The types of *Anthomyia bina* Wied., which Dr. S. L. Tuxen has kindly enabled me to study, are a male of the present species, which male is herewith designated as the type, and a female of the very similar *Xenosina femorata* Mall.

198*b*. **Xenosia bina brunneifemorata** ssp. n.

(Fig. 105)

♂ : Similar in size and structural characters to *bina* and *steini*, the frons of the male more distinctly narrowed in front of the *ocelli* than in *steini* but much less so than in *bina*, with slightly concave sides, almost one-seventh to one-sixth head-width, 3–4 times width of a parafrontale at middle. Third antennal segment brown, except at base. *Thorax* with four conspicuous incomplete vittae, which are usually fuscous. *Abdomen* with a pair of conspicuous small brown spots near hind margin of second and third segments. *Wings* as in *bina*. *Legs:* Fore tibia without a *p* seta; fore femur of male largely infuscated; mid and usually hind femora infuscated on basal half. For ♂ genitalia *see* Fig. 105.

Distribution.—INDIA: Mussoorie, U.P., 22.VI.05 (*E. Brunetti*), ♂ type, 3 ♂ paratypes, 20–26.V.05, 2 ♂ paratypes; Jhansi, U.P., 2.VIII.05 (*E. Brunetti*), 1 ♂ paratype; Jubbulpore, C.P., 15.XI.07 (*E. Brunetti*), 1 ♂ without head.

Only one female *Xenosia* from these localities (Mussoorie) is at hand, and this is indistinguishable from *bina*. Therefore, and because of the restricted area from which it is known, *brunneifemorata* is believed to be only a geographical race of *bina* in spite of the considerable difference in the male genitalia.

Genus 33. **Xenosina** Malloch.

1925. *Xenosina* Mall., *Philipp. J. Sci.*, **XXVI**, 508, 509; 1935, *Ann. Mag. n. H.* (10), **XVI**, 226; Hennig, 1952, *Beitr. Ent.*, **II**, 86. Type: *Mydaea morosa* Stein.

1928. *Pahangia* Mall., *Ann. Mag. n. H.* (10), **II**, 311; Sèg., 1937, *Gen. Ins.*, 205, *Musc.*, 341. Type: *P. flavipennis* Mall. (n. syn.).

1928. Sbg. *Lasiopelta* Mall., *Ann. Mag. n. H.* (10), II, 309; Sèg., 1937, *Gen Ins.*, 205, *Musc.*, 343, 344. Type: *L. orientalis* Mall.

Head: Eyes in male slightly separated to contiguous, in female more or less broadly separated; inclinate and reclinate setae developed normally, anterior reclinate somewhat weaker than posterior one; ocellars, and in female the two pairs of verticals, well developed; arista long-plumose. Ventral margin of head more or less strongly convex and ascending in front; vibrissa almost always above level of lower eye margin. *Thorax* with 0 (a male of *setipennis* is reported to have 2 small *prst acr*)+1 *acr*, and 2+3–4 *dc*; prosternum hairy, propleural depression, pteropleura and postalar declivity bare, anterior mesopleural distinct, infrasquamal hairs absent; metathoracic spiracle without black setulose hairs; 1+2 *stpl.* *Abdomen* rather short, frequently the anterior segments glossy fuscous-brown with brownish dust and the fourth with contrasting grey dust. *Wings* with sinuous *sc*; r_1 often setulose on part of dorsal or ventral surface or both, base of r_{4+5} setulose on dorsal and ventral surfaces, *m* markedly upcurved at tip (hardly so in *dissimilis*). Inner margin of lower calyptra diverging on its entire length from lateral margin of scutellum. *Legs:* Fore tibia without a *p*, mid tibia without an *av*, *ad* or *pv* seta but with 2–3 rather strong *p* setae; mid femur with an *a* pre-apical except in *sordida*; hind tibia with a well-developed *ad* pre-apical.

Distribution.—CEYLON and INDIA to FORMOSA, PHILIPPINES, BORNEO and FLORES.

Biology.—Adults on grass and herbage (e.g. mountain Rhododendron), and in jungle.

Malloch (1935) published an excellent key, which includes most of the species so far described from the area covered by the present publication. Hennig (1952) gave a brief amended key.

Lasiopelta differs from *Pahangia* only in minor characters and is not very closely related to *Dichaetomyia* with which Sèguy (1937) synonymized it. It actually has page priority over *Pahangia*. However, both *Pahangia* and *Lasiopelta* cannot possibly be separated from *Xenosina*, as the setulae on r_1 which characterize *Xenosina* are found in most if not all the species of both *Pahangia* and *Lasiopelta* if sufficient specimens are examined. In fact I have seen specimens with setulose and bare r_1 of species placed in *Pahangia* and *Lasiopelta* by Malloch himself, and many more specimens of *Xenosina tarsalis*, of which Malloch already mentioned such a paratype, without setulae on r_1 than with these.

Key to the Species of XENOSINA

1 (30) *pra* small or indistinct, always shorter than second *npl.* Transverse veins not suffused, but the wing sometimes largely smoky. 4 strong *post dc.*

2 (15) Anterior *ia* present and strong. Region of lower edge of scutellum bare, but the black decumbent setulae of the dorsal surface sometimes (Fig. 106*b*) extending to upper part of lateral surface below level of setae. Auxiliary prostigmal well developed.

3 (12) Ventral and lateral surfaces of scutellum bare below level of setae (Fig. 106*a*). Shoulders (normally) fuscous-black. Antennae largely brown to fuscous.

4 (11) Lateral surface of scutellum more or less broadly fuscous at base or wholly fuscous, rest of thorax wholly fuscous-black.

5 (10) Basicosta and coxae fuscous, trochanters brown, femora often more or less dark, tarsi piceous. Smaller species.

6 (9) Posterior or all femora and apex of scutellum pale testaceous. ♂ : Eyes separated by about width of ocellar tubercle.

7 (8) Eyes densely long-haired, hairs about thrice diameter of a facet. Anterior thoracic spiracle pale testaceous. ♂ : Fore femur fuscous with the apex narrowly pale ferruginous; anterior facets of eye hardly enlarged. . . . *lasiophthalma* sp. n., p. 440

8 (7) Eyes almost bare, hairs sparse and not longer than diameter of a facet. Anterior thoracic spiracle fuscous. ♂ : Fore femur wholly pale ferruginous (always ?); anterior facets of eye markedly enlarged. . . . . *trochanterata* sp. n., p. 442

9 (6) All femora brown to piceous-brown like rest of legs except the testaceous tibiae; scutellum wholly fuscous. ♂ : Second and third abdominal segments with a pair of faint shifting elongate fuscous-black paramedian spots. . *tenax* (Stein), p. 442

10 (5) Basicosta, trochanters, posterior (or all) femora and tarsi pale testaceous, but apical segments of tarsi browned. . *femorata* Mall., p. 444

11 (4) Lateral surface of scutellum wholly pale testaceous, basicosta, trochanters, femora and tibiae also pale, coxae usually browned, tarsi of male piceous-brown, of female browned at tip. Second and third abdominal segments uniformly dusted brown with only a narrow grey-dusted median vitta, fourth largely dusted grey. . *tarsalis* Mall., p. 446

12 (3) Lateral surface of scutellum with black decumbent setulae on upper part, which extend from dorsal surface downward to beyond level of setae (Fig. 106*b*). Legs pale ferruginous, only tarsi more or less browned. Shoulders pale testaceous (in *scutellaris* sometimes darkened).

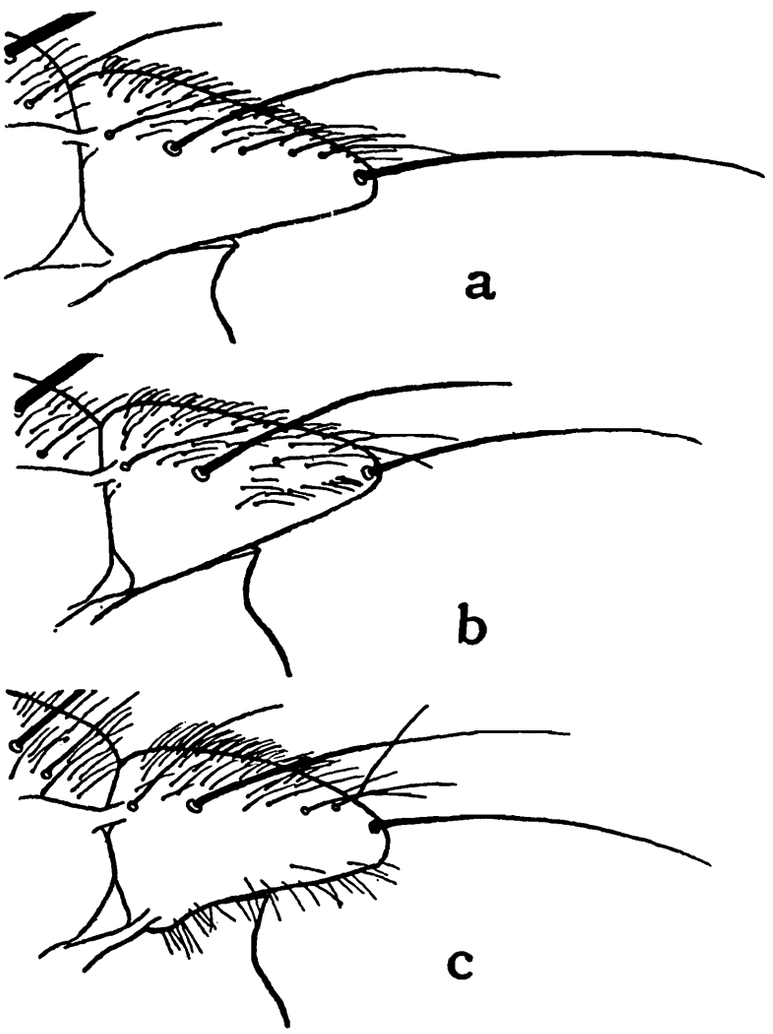


FIG. 106. Lateral view of scutellum of *a*, *Xenosina tarsalis* Mall., ♂; *b*, *Xenosina tarsalis scutellaris* Mall., ♀; *c*, *Xenosina ruficollis* sp. n., ♂ type.

13 (14) Scutellum rather evenly dusted, basal angles only a little more densely dusted. Paramedian vittae of mesonotum of almost even width, less than half as wide behind suture as the pale dusted stripe between them. Fourth abdominal segment dusted pale grey, intermediate segments dusted grey or greyish-brown but not glossy fuscous-brown or piceous. Antennae largely brown to fuscous. Tarsi pale like tibiae, only apex slightly browned. *tarsalis f. scutellaris* Mall., p. 448

14 (13) Scutellum ochraceous dusted on disc, and, in posterior view, with a small elongate-triangular spot of pale yellowish dust in each basal angle. Paramedian vittae of mesonotum conspicuously widened behind suture, as wide at widest part (in posterior view) as the pale dusted median vitta between them. Fourth abdominal segment dusted pale grey, intermediate segments contrasting glossy fuscous-brown or piceous. Antennae pale ferruginous, third segment largely darkened. Tarsi strongly browned.. .. *setipennis* Mall., p. 448

15 (2) Anterior *ia* absent or very small; in the latter case region of lower edge of scutellum with fine setulose hairs (Fig. 106*c*).

16 (21) Ventral and lateral surfaces of scutellum bare below level of setae. Mesonotum including shoulders fuscous-black.

17 (18) Basicosta fuscous with blackish pile. Legs fuscous with ferruginous tibiae. Fourth tergite with only a linear pale hind margin. Wing more than 9 mm. long. ♂: Frontal setae strong, suddenly discontinued towards upper third of frons. . *elongata* sp. n., p. 450

18 (17) Basicosta pale ferruginous with golden pile. Wing up to 7 mm. ♂: Frontal setae becoming finer above, sometimes discontinued towards upper third, but always a conspicuous reclinate seta present near anterior ocellus. ♀: Tarsi pale ferruginous.

19 (20) Margins of scutellum pale testaceous. Apex of fourth tergite as a rule broadly pale ferruginous. ♂: Row of frontal setae complete, the reclinate one linked by setulae to the inclinate anterior ones; tarsi pale ferruginous. .. *pudica rufomarginata* (Mall.), p. 451

20 (19) Scutellum wholly piceous. Fourth tergite like rest of body wholly fuscous-brown; disc of mesonotum rather densely silver-white and brownish dusted with a narrow dark vitta inward of each *dc* row and with broad dark vittae outward to the *dc*. ♂: Row of frontal setae broadly interrupted between the reclinate and the last of the inclinate ones, which is subequal in length to the reclinate seta; tarsi brown. . ... *flavipennis* (Mall.), p. 453

21 (16) Lateral part of ventral and lower part of lateral surface of scutellum with fine setulose hairs (Fig. 106c), some or all of them pale; the lateral surface otherwise largely bare. Anterior *ia* absent. Shoulders concolorous with mesonotum, *i.e.* dark except in *ruficollis*.

22 (23) Thorax wholly pale ferruginous, head and abdomen fuscous. *ruficollis* sp. n., p. 454

23 (22) Thorax fuscous-black; if the scutellum is largely pale ferruginous the coxae of the same colour. Abdomen wholly fuscous-black.

24 (29) Femora and tibiae pale ferruginous.

25 (28) Tarsi and coxae pale ferruginous. Wing length normally upwards of 7 mm.

26 (27) Scutellum fuscous-black. Abdomen evenly bluish-grey dusted, fourth tergite not contrasting. *m* rather strongly upcurved at tip. ♂: Eyes subcontiguous, frontal row complete.. . *morosa* (Stein), p. 456

27 (26) Scutellum pale ferruginous except at base. Anterior three tergites dusted brown (♂) or brownish-grey (♀), fourth dusted pale grey and strongly contrasting in posterior view. *m* somewhat less upcurved. ♂: Eyes contiguous, frontal row hardly exceeding middle of frons.... . . *canoapicata* sp. n., p. 457

28 (25) Tarsi browned or piceous, in male anterior coxae piceous. Wing length not reaching 6·5 mm.

Fourth tergite dusted pale grey, strongly contrasting with anterior tergites (♀), or intermediate tergites with large paired spots (♂). ♂ : Eyes subcontiguous. *lauta* (Stein), p. 458

29 (24) Femora and coxae piceous, tibiae brownish-testaceous, the front ones somewhat darker. Scutellum piceous-black in ground-colour. Dust of abdomen as in *kambaitiana*. ♂ : Eyes contiguous. *solennis* (Walk.), p. 460

30 (31) *pra* at least as strong as second *npl*. Anterior *ia* strong. Lateral surface of scutellum with at least a single row of decumbent setulae below level of setae. Ground-colour of mesonotum rufous. Antennae orange-yellow, third segment somewhat darkened in female. r_{2+3} rather approximated to costa from level of *m-m* to apex. Hind tibia with a weak *pd* seta towards or at middle. (*Lasiopelta* Mall.).

31 (34) 3 strong *post dc*. ♂ : Eyes contiguous, anterior facets markedly enlarged.

32 (33) Mesonotum glossy, almost undusted (♂ only ?), with only some pale brown dust above neck between the paramedian vittae, which are therefore not defined laterally. Lateral surface of scutellum with only a row of setulae just below level of setae. Wings with a strong yellowish tinge; R_5 not markedly narrowed at apex.. *dissimilis* sp. n., p. 462

33 (32) Mesonotum rather densely dusted whitish-grey on disc from neck to scutellar suture and from median line to beyond the *ia*; paramedian vittae linear but sharply defined in front of suture, brown-dusted behind. Lateral surface of scutellum with a, partly double, row of setulae just below level of setae and a group of setulae near base scattered about ventral margin. *sordida* (Stein), p. 463

34 (31) 4 *post dc*, the second weak or strong. Mesonotum with conspicuous dust and 5 undusted vittae. Lateral surface of scutellum rather richly setulose.

35 (36) Second to fourth abdominal segments almost solidly glossy piceous, without a trace of a paler median vitta and not markedly

paler at base of third segment. Tarsi pale ferruginous, with only the apical 1–2 segments somewhat browned. Hypopleura with setulose hairs above and below. ♂: Eyes separated by almost twice width of ocellar tubercle; hind femur with about 6–8 moderately strong *pv* setae in basal half.. .. *orientalis* (Mall.), p. 464

36 (35) Second to fourth abdominal segments with a suffused paler median vitta and paler bases, except on each side of median vitta (*i.e.* with a suffused paramedian dark vitta and more or less broad suffused dark hind margins, except at median line). Tarsi more conspicuously browned to piceous. Hypopleura bare. ♂: Eyes contiguous; hind femur with only 2–3 strong *pv* setae in basal half.. *similis* (Mall.), pp. 466, 467

37 (38) Auxiliary prostigmal conspicuous. Scutellum bare along lower edge. Darker. ♀: Frons narrower and parallel-sided. . . .. *similis similis* (Mall.).

38 (37) Auxiliary prostigmal hair-like. Scutellum with a few black setulose hairs along lower edge. Paler, with the pattern of the abdomen much more distinct. ♀: Vertex three-tenths head-width, and frons somewhat widened at middle. *similis septentrionalis* ssp. n., p. 467

199. **Xenosina lasiophthalma** sp. n.

♂ ♀: Fuscous-black with pale testaceous translucent apex of scutellum, pale ferruginous femora (except front femur of male) and tibiae, and piceous tarsi, body rather densely dusted pale grey, the dust somewhat brownish on disc of dorsal surface; mesonotum with four thinly-dusted dark vittae. *Head* everywhere densely dusted grey, only lower part of cerebral almost undusted, dark, and interfrontalia black and matt; eyes rather densely haired; frons of male one-twelfth head-width, interfrontalia ribbon-like on upper half, triangularly dilated in front, parafrontalia dusted brown in upper two-fifths, dusted silver-white anteriorly; linear, somewhat broadened in anterior half, where 6–9 inclinate setae are present, these are connected by hairs with the conspicuous (though weak) reclinate seta just in front of anterior ocellus; ocellars moderately strong, verticals indistinct; frons of female at vertex more than a quarter (0·28)

head-width, evenly widened with straight sides to lunula where it is a third (0·34) head-width, frontal triangle dusted grey, matt, reaching lunula, interfrontalia markedly narrowed at extremities, at middle four times width of a parafrontale, the latter with 4–5 strong inclinate setae, alternating with weak ones, on more than anterior half and, on outer part, with a row of proclinate black setulae, towards vertex with 2 reclinate setae, the anterior of which is much the weaker; ocellars and inner and outer verticals strong; parafacialia more than a third width of third antennal segment, antennae piceous-brown with fuscous third segment, jowls half as wide again as third antennal segment, the latter falling short of mouth-margin by fully its own width; arista long-plumose, rays slowly decreasing in length from apical third onwards, longest ones twice as long as width of third antennal segment. *Thorax* moderately densely dusted grey, the dark vittae thus defining 3 (5) rather broad and conspicuous pale vittae, paramedian dark vittae fading out behind second *post dc*, outer vittae rather broadly interrupted at suture; *prsc* rather long, 4 strong *post dc*; hypopleura with some minute hairs above hind coxa. *Abdomen* rather densely dusted grey to cinereous-grey, intermediate segments suffusedly browned on each side of a moderately narrow median strip, in dorsal view the browned area becoming fuscous and extending almost to lateral margin; anterior segments with only lateral marginals, third and fourth with a well-developed row of long marginals, third also with lateral discals, and fourth with a discal row. *Wings* greyish subhyaline, in male markedly browned, except near hind margin; veins brown, r_1 reaching (♀) or slightly exceeding (♂) level of *r-m*, the latter beyond middle of discal cell; r_{4+5} and *m* conspicuously converging at apex, r_{4+5} somewhat curved back and slightly sinuous, *m* rather strongly upcurved, *m-m* somewhat oblique and outwardly rather concave. Calyptrae subopaque, pale ochraceous-grey with cream border and pale golden fringe. Halteres reddish-yellow. *Legs* with fuscous coxae, brown trochanters and piceous tarsi, femora and tibiae pale ferruginous, but front femur of male fuscous-brown with the apical fifth suffusedly pale ferruginous, mid femur with some *av* setae near base and a row of rather long and dense decumbent setulae on rest of *av* surface, *pv* surface with 6–8 setae on more than basal half; hind femur with a complete row of *c.* 10 *av* setae, of which 3–4 near apex are somewhat stronger, and without distinct *pv* setae, hind tibia with 2 *ad* and 2 rather weak *av* setae, the *ad* surface with a row of slightly longer setulae from the base to the setae.

Length.—6·8–7·2 mm., of wings 6·4–6·9 mm.

Distribution.—N.E. BURMA: Kambaiti, 2,000 m., 6.IV.34 (*R. Malaise*), ♂ type (in Mus. Stockholm); 30.IV.34, 1 ♂ paratype (in B.M.); 8.IV.34, 1 ♀ paratype.

In the three typical specimens the dorsal surface of r_1 is bare.

200. **Xenosina trochanterata** sp. n.

♂ ♀: Apart from the sparsely haired eyes, dark anterior thoracic spiracle, pale front femur of the male, the conspicuously enlarged anterior facets of the eye in this sex, and somewhat smaller size, the present form is indistinguishable from *lasiophthalma*. The third antennal segment is slightly longer than in that species and falls short of mouth-margin by about half its width. The apex of *m* is slightly less upcurved.

Length.—5·4–6·9 mm., of wings 5·1–6·5 mm.

Distribution.—N.E. BURMA: Kambaiti, 2,000 m., 11.V.34 (*R. Malaise*), ♂ type, 1 ♀ paratype, 6.IV–4.VI.34, 11 ♀ paratypes (type in Mus. Stockholm, paratypes in Mus. Stockholm, Helsinki and B.M.). S. INDIA: Kodaikanal, Pulni Hills, IV–V.53 (*P S. Nathan*), 1 ♂ 1 ♀ paratypes (in B.M. and coll. P. H. Arnaud).

The differences from *lasiophthalma* are very slight and somewhat subject to variation, so that it is doubtful if this form is really distinct from it. The front femora of the female are sometimes infuscated at base or largely infuscated, and there is perhaps no reason for assuming that these femora will always be pale in the male. In 3 female paratypes 1–2 setulae are present on dorsal surface of r_1.

201. **Xenosina tenax** (Stein).

1918. ! *Mydaea tenax* Stein, *Ann. Mus. nat. Hungar.*, **XVI**, 172, 181; Hennig, 1952, *Beitr. Ent.*, **II**, 86. Type: Hong Kong. Mus. Berlin.

Wholly fuscous-black and fuscous-brown, only tibiae pale ferruginous; rather densely dusted grey, mesonotum with 4 narrow dark vittae, abdomen in male in posterior view with an elongate undusted paramedian spot on second and third segments. *Head* rather densely dusted pale grey, parafacialia and parafrontalia in male silver-white; eyes sparsely short-haired, in female almost bare; in male separated by $\frac{1}{11}-\frac{1}{16}$ head-width, anterior facets somewhat enlarged, interfrontalia dull black, very narrow above middle, slightly widened to ocelli and rather strongly widened to lunula, parafrontalia

almost linear, very slightly widened below, with a complete row of about 10 inclinate and 1–2 conspicuous reclinate setae, ocellars moderately strong, verticals weak and rather indistinct; frons of female over a quarter (0·26–0·27) head-width at vertex, rather strongly dilated with straight sides to lunula, where it is a third head-width, poorly defined, somewhat pale dusted, its apex narrowly drawn out from middle of frons almost to lunula, interfrontalia markedly narrowed behind and in front, 4–5 times as wide at middle as a parafrontale, the latter with 4–5 strong and 2–3 interspersed weak inclinate setae and, to their outer side, with a row of small proclinate black setulae, ocellars and verticals strong; parafacialia one-half (♂) to one-third (♀), jowls fully, as wide as third antennal segment, the latter falling short of mouth-margin by one-half (♀) to fully (♂) its own width. Arista as in *lasiophthalma*. *Thorax* rather densely dusted grey, the dust only slightly more brownish on centre of disc, vittae narrow, thinly dusted fuscous-brown, paramedian ones shortly interrupted behind second *post dc*, outer ones forming a triangular spot in front of suture, narrow and doubled behind suture; *prsc* rather small, 4 strong *post dc*; hypopleura with some small hairs above hind coxa. *Abdomen* densely dusted grey, on intermediate segments dust suffusedly browned on either side of median vitta, fourth segment dusted brownish on disc; anterior segments with distinct lateral discals and marginals, third with lateral discals and a row of strong marginals, fourth with a row of strong discals and marginals; setae stronger in male. *Wings* brownish subhyaline with light brown veins; r_1 exceeding level of *r-m*, which lies at almost three-fifths of discal cell; r_{4+5} and *m* converging at apex, r_{4+5} shallowly sinuous; *m* rather upright, outwardly concave. Lower calyptra pale yellowish-grey, opaque, with creamy margin and pale golden fringe. Halteres pale reddish-yellow. *Legs* fuscous-brown with only the tibiae pale testaceous; mid femur with the *av* row as in *lasiophthalma*, *pv* surface with 4–5 setae on basal half and, especially in male, a row of rather dense decumbent setulae which become longer near apex; hind femur in male with a complete row of 8–10 *av* setae, in female with only 3 strong ones near apex, another rather strong one at basal third and 2 weak ones basad, hind tibia with 1 strong *av* and 2(–3) *ad* setae.

Length.—5·7–7·6 mm., of wings 5·6–7·1 mm.

Distribution.—HONG KONG (paratype in B.M.). FORMOSA. N.E. BURMA: Kambaiti, 2,000 m. N. INDIA: Darjeeling.

There is in coll. Senior White a male in poor condition from Shillong, Khasia Hills (Assam), which is smaller (wing

5·2 mm.), has pale tarsi and *av* setae (4–5) on only apical two-fifths of hind femur. It represents probably a different species and is the only specimen possibly belonging to *tenax* with setulae on r_1. It is uncertain whether Stein's typical female from Mussoorie is really *tenax*. Hennig (1952) selected a male cotype from Hong Kong in the Berlin Museum as the type of this species, stating that it is 'eine echte *Mydaea*-Art', but he has been good enough to check this type for me and to confirm that the prosternum is setulose and that the lateral surface of the scutellum is quite bare below the level of the setae. The type is thus undoubtedly conspecific with the B.M. specimen from Hong Kong labelled 'Type' by Stein. Another specimen from Hong Kong, 4.III.06, labelled 'Type' by Stein, has the basicosta and all trochanters and femora pale and is identical with *femorata* Mall. Stein's description does not mention the occurrence of a pale-legged 'variety'

202. **Xenosina femorata** Malloch.

1830. ! *Anthomyia bina* Wied., *Aussereur. zweifl. Ins.*, **II**, 426 (pars).
1935. ! *Xenosina femorata* Mall., *Ann. Mag. n. H.* (10), **XVI**, 227, 229. Type: Bettotan. In B.M.

Wholly fuscous-black with the trochanters, posterior or all femora, tibiae, tarsi, and in female also palpi and antennae, pale testaceous to pale ferruginous, tarsi somewhat browned at tip. *Head* rather densely dusted pale grey, parafacialia and parafrontalia of male more silver-grey; eyes practically bare, in male almost contiguous, interfrontalia perfectly linear or obsolete above middle, visible as a minute triangle above and as a moderately broad one below, parafrontalia almost linear, slightly widened in front, with 5–6 strong inclinate setae on anterior half, which are connected by 3–4 fine setulose hairs with the moderately strong reclinate seta near anterior ocellus, ocellars strong or moderately strong, verticals fine and indistinct; frons of female fully a quarter head-width at vertex, evenly and rather strongly dilated with straight sides to lunula where it is a third head-width, frontal triangle evenly dusted pale grey, rather well defined but fading out near lunula, interfrontalia markedly narrowed in front and behind, four times as wide at middle as a parafrontale, the latter with 6–7 strong inclinate setae, 1–2 intercalated very small ones, and on outer part with a conspicuous row of small proclinate setulae, ocellars and verticals strong; parafacialia linear in profile, but in antero-lateral view a third, jowls almost to fully, width of third antennal segment, the

latter falling short of mouth-margin by less than its own width; arista long-plumose, length of rays slowly decreasing from middle onwards, the longest rays almost to fully twice as long as width of third antennal segment. *Thorax* moderately densely (♂) or densely (♀) dusted pale grey, the dust somewhat brownish on posterior median part, vittae dusted fuscous-brown, the paramedian ones very conspicuous in front of suture in male, in female more thickly dusted and only moderately conspicuous, outer ones in male very conspicuous in dorsal view on the declivitous part, but the inner streak between *post dc* and *ia* rather dusted and not very conspicuous; *prsc* moderately strong, 4 strong *post dc*; hypopleura with 1–2 small pale hairs above hind coxa. *Abdomen* rather densely dusted pale grey, the intermediate segments in male dusted brown with narrow grey margins and a narrow not very conspicuous median vitta, fourth segment in male with some brown dust near base of disc, in female with pale ferruginous apical sixth; setae as in *tenax*. *Wings* greyish subhyaline, in male with a slight brownish tinge, veins testaceous; r_1 somewhat exceeding level of *r-m*, which lies beyond middle of discal cell; r_{4+5} and *m* converging at apex, r_{4+5} shallowly sinuous; *m-m* rather upright, slightly concave outwardly. Lower calyptra subopaque, in male brownish-grey with pale brownish border and pale golden fringe, in female whitish-grey with concolorous border and pale golden fringe. Halteres pale reddish-yellow. *Legs* pale with fuscous-brown coxae and browned tip of tarsi, in type fore femur largely brown; mid femur with 1–2 *a* setae near middle, *av* surface with some more erect and longer setulose *av* hairs on basal third and the decumbent *av* hairs near apex also somewhat longer, *pv* surface with 4–6 strong setae on less than basal half; hind femur with a complete *av* row of which the 4 (♂) or 1–2 (♀) distal setae are conspicuously stronger, hind tibia with 2 *ad* and 2–1 *av* setae.

Length.—5·4–6·7 mm., of wings 5·2–5·9 mm.

Distribution.—N. Borneo (Bettotan nr. Sarawak) (type). Hong Kong. Formosa. Burma: Kambaiti (Zibingi nr. Maymyo). S. India (Coïmbatore; Palani Hills). Ceylon (Teldeniya; Hingurakgoda).

The typical males of *X. sparsiseta* (Stein) (1915, *Suppl. ent.*, IV, 20) from Formosa seem to differ only by much thinner pollinosity of the dorsal surface, so that the normal 4 dark vittae are indistinct, but a male from Formosa submitted by Mr. Su-yung Liu does not differ from the present species with which *sparsiseta* may, therefore, be identical. Malloch (1925 and 1935) who has not seen that species (*see*

1925, *Phil. J Sc.*, **XXVI**, 510) places it in the section with hairs on lateral surface of scutellum, but Hennig, who has studied the types, keys *sparsiseta* out with the forms in which that surface is bare. *X. sparsiseta* must thus be very closely related to *femorata*, the type of which is somewhat less densely dusted than the other males but has very conspicuous paramedian vittae. It is the only specimen seen with dark front femora. The middle part or more of r_1 is setulose in the specimens examined. The specimens from S. India and Ceylon are more densely pale dusted.

203*a*. **Xenosina tarsalis** Malloch.

(Fig. 106*a*)

1935. ! *Xenosina tarsalis* Mall., *Ann. Mag. n. H.* (10), **XVI**, 232 (♂). Type: Fraser's Hill. B.M.

Fuscous-black with the ventral and lateral surfaces of the scutellum pale testaceous, this colouration often suffusedly extending to apical and lateral parts of dorsal surface; anterior thoracic spiracle pale yellow, legs pale ferruginous, tarsi of male piceous-brown, coxae more or less browned; in female (and very seldom in male) shoulders pale ferruginous and tarsi pale with browned tip. *Head* rather densely dusted pale grey, parafacialia and parafrontalia silver-grey; eyes sparsely short-haired, in male subcontiguous, separated by about $\frac{1}{20}$ head-width, interfrontalia linear, sometimes obsolescent, above middle, and distinct as a narrow triangle above and as a moderately broad one below, parafrontalia almost linear above, slightly broadened below where there are about 6 strong inclinate setae which gradually become smaller and pass into a row of setulae and hairs continuing to the weak though conspicuous reclinate seta, ocellars rather strong, verticals poorly differentiated; frons in female a quarter head-width at vertex, slightly dilated to lunula where it is almost or fully three-tenths (0·28–0·31) head-width, frontal triangle dusted grey, practically reaching lunula, interfrontalia distinctly narrowed at extremities, four times as wide at middle as a parafrontale, the latter with 4–6 strong inclinate setae, which alternate with small ones, and, on outer side, rather numerous black hairs, ocellars and verticals strong; parafacialia in male less than, in female fully, a third, jowls subequal to, width of third antennal segment, the latter falling short of mouth-margin by less than its own width; arista long-plumose, rays only becoming shorter from middle onwards, longest ones almost or fully twice as long as

width of third antennal segment. *Thorax* not very densely dusted grey, the dark vittae somewhat fuscous, defining 3 (5) broad vittae which are conspicuous only in posterior view and especially on *prst* part, paramedian dark vittae becoming suffused towards second *post dc*, outer vittae rather broadly interrupted at suture; *prsc* moderately strong, 4 strong *post dc*. *Abdomen* rather densely dusted pale grey, intermediate segments in male wholly or almost wholly brown-dusted, with or without a narrow grey median vitta; anterior segments with only lateral marginals, third with lateral discals and a conspicuous marginal row, fourth with a discal and a marginal row. *Wings* greyish subhyaline with a slight brownish tinge, veins light brown to testaceous; r_1 not or slightly exceeding level of *r-m*, which is somewhat oblique and lies well beyond middle of discal cell; r_{4+5} somewhat sinuous and slightly curved backward, *m* rather conspicuously upcurved at tip, *m-m* moderately oblique and somewhat sinuous. Lower calyptra subopaque, in male pale greyish-brown to greyish-ochraceous with brownish-cream border and pale golden fringe, in female more greyish. Halteres pale reddish-yellow. *Legs:* Mid femur with a fringe of longer setulose *av* hairs, those on basal three-fifths stronger and more erect, and with a row of 4–6 rather strong *pv* setae on basal half and decumbent *pv* setulae on apical half, in female all these setae and setulae are similar but shorter and less numerous; hind femur with a complete *av* row, which in male contains rather strong setae, the apical 4–6 (♂) or 2–3 (♀) setae stronger, and without *pv* setae, hind tibia with 2 *ad* and 1–2 *av* setae, in addition with a row of longer *ad* hairs.

Length.—6·0–8·7 mm., of wings 6·2–7·9 mm.

Distribution.—MALAYA: Fraser's Hill, Pahang, 4,000 ft. (type in B.M.). N. BORNEO (Samawang nr. Sandakan) (paratype). FORMOSA. N.E. BURMA: Kambaiti, 2,000 m. N. INDIA: Assam, Kurseong. S. INDIA: Nilgiri Hills. CEYLON (various localities).

Malloch mentions that the paratype has no setulae on r_1. Among 26 specimens from Kambaiti none has these setulae, and I have seen other specimens with bare r_1 from S. India and the Himalayas, and specimens with setulose r_1 from Ceylon and Assam. All the males seen except the type have r_1 bare, and the specimens from Ceylon and Assam with setulae on r_1 are females. In these specimens the lateral surface of the scutellum is wholly or almost wholly bare below level of setae. More than 30 specimens of *X. scutellaris* Mall. are at hand. They are all females, and in all of them r_1 and the lateral surface of the scutellum are setulose. The

outer vittae of the mesonotum are present in most specimens of *tarsalis* and *scutellaris*, and these forms differ only in the setulae on the lateral surface of the scutellum. I am practically convinced, therefore, that *scutellaris* Mall. (*q.v.*) is the female of the present species.

203*b*. **Xenosina tarsalis** *f.* **scutellaris** Malloch.

(Fig. 106*b*)

1915. *Mydaea arminervis* (Stein) of Stein, *Suppl. ent.*, **IV**, 23 (pars.), nec Stein, 1900?; 1918, *Ann. Mus. nat. Hungar.*, **XVI**, 152; Hennig, 1952, *Ent. Beitr.*, **II**, 86.

1935. ! *Xenosina scutellaris* Mall., *Ann. Mag. n. H.* (10), **XVI**, 227, 233 (♀). Type: Gunung Benom. B.M.

Differs from *tarsalis* Mall. only by the setulose upper part of the lateral surface of scutellum below level of setae and by the shoulder callosity being often partly or wholly pale ferruginous.

Distribution.—MALAYA: Gunung Benom, Pahang, 6,000 ft. (♀ type; in B.M.); Cameron Highlands; Lubok Tamang, Pahang, 3,500 ft. N.E. BURMA: Kambaiti, 2,000 m. S. INDIA: Palni Hills; Nilgiri Hills. CEYLON (various localities). FORMOSA: Tapani (in B.M.; named *arminervis* by Stein).

The twenty specimens seen by Malloch must all have been females, since he describes only this sex, nor do the 36 specimens from various countries which I have seen include a male. As stated above it appears practically certain that *scutellaris* is simply the normal female of *tarsalis* (*q.v.*). There is no 'allotype' and no 'paratype' in the B.M., the specimen from Lubok Tamang belonging to the typical series but not having been designated as a paratype. As Malloch described only one sex, the mention of an 'allotype' in his description is obviously erroneous. The Tapani female was obtained in exchange from the Budapest Museum and is one of those mentioned by Stein in 1918 as *arminervis*. Hennig's key deals with the same form. It is very uncertain, however, if Stein's type of *arminervis*, described in 1900 from New Guinea (Hüon Gulf), is the same species, although the description fits perfectly.

204. **Xenosina setipennis** Malloch.

1930. ! *Xenosina setipennis* Mall., *Ann. Mag. n. H.* (10), **VI**, 332, ♀; 1935, l.c. (10), **XVI**, 228, ♀ Type: Kedah Peak. B.M.

1935. ! *Xenosina dubitalis* Mall., *Ann. Mag. n. H.* (10), **XVI**, 228, 231, ♀ Type: Fraser's Hill. B.M. n. syn.

Fuscous-black, thorax with shoulders and scutellum and sometimes most of pleurae and lateral part of mesonotum pale ferruginous, as are the legs except for the piceous-brown tarsi. *Head* rather densely dusted pale grey; eyes almost bare; frons at vertex (♀) more than one-fifth (0·21–0·24) head-width, evenly dilated with almost straight sides to lunula where it is almost three-tenths head-width; frontal triangle very slightly dusted grey, very narrow and elongate, reaching lunula, interfrontalia somewhat narrowed at extremities, four times as wide at middle as a parafrontale, the latter with 4 strong inclinate setae, which alternate with small ones, and on outer part a row of proclinate black setulae; ocellars and verticals strong; parafacialia a quarter to a third, jowls three-quarters to fully, width of third antennal segment, the latter almost reaching mouth-margin in type of *setipennis*, but falling short by its own width in type of *dubitalis*; arista long-plumose, the rays slowly decreasing in length on apical third, the longest almost twice as long as width of third antennal segment. *Thorax* with the pleurae largely pale ferruginous with fuscous suffusions (*setipennis*) or almost wholly fuscous (*dubitalis*), dorsum moderately densely dusted pale grey at sides and on disc, the dust more or less brownish on median *post* part and on median basal part of scutellum, the four undusted vittae very conspicuous, in front of scutellum a wedge-shaped median vitta present; *prsc* rather small, 4 strong *post dc*. *Abdomen* with the intermediate segments thinly dusted brown, in posterior view glossy piceous, the first similar (*setipennis*) or dusted grey (*dubitalis*), and the fourth densely dusted grey; third segment with a row of strong marginals (3–4 pairs), fourth with a similar discal row and a much weaker marginal row. *Wings* subhyaline, brownish with more ochraceous base, veins pale testaceous, r_1 setulae to apex (in *dubitalis* apical third with only 1 small setula), r_{4+5} setulose to beyond *r-m* (in *dubitalis* setulae exceeding *r-m* only on underside); in the type of *setipennis* the fifth vein also with a few setulae; r_1 hardly exceeding level of *m-m*, which lies well beyond middle of discal cell, r_{4+5} shallowly sinuous near apex, converging with *m*, which is rather strongly upcurved; *m-m* somewhat oblique rather strongly concave outwardly. Lower calyptra pale brownish-ochraceous with more yellowish border and pale golden fringe. Halteres pale reddish-yellow. *Legs* (posterior ones missing in type of *dubitalis*): Mid femur with a row of not very strong erect *av* and slightly stronger *pv* setae on basal half, hind femur with a complete row of rather strong

av setae, hind tibia with 2 *ad* and 3 *av* setae (only one tibia preserved).

Length.—7·3–7·8 mm., of wings 6·8–7·2 mm.

Distribution.—MALAYA: Kedah Peak, 3,000 ft.; Fraser's Hill, Pahang, 4,000 ft.

In the type *m* has a few setulose hairs from about *r-m* to *m-m* on both the dorsal and ventral surfaces, but these are not present, according to Malloch, in a male from MALAYA: Fraser's Hill, Pahang, 4,000 ft., which he with some doubt considers conspecific. This male, which I have not seen, differs moreover by two pairs of short *prst acr* and the setulae on r_{4+5} which do not quite reach *r-m*. It connects *setipennis* with *dubitalis*, the type of which is also from Fraser's Hill, 4,000 ft., and was found only one day later, so that I am satisfied that *dubitalis* is a synonym of the present species.

205. **Xenosina elongata** sp. n.

♂: Fuscous-black, only the tibiae ferruginous, somewhat infuscated at base, fourth tergite with an inconspicuous linear ferruginous hind margin, anterior thoracic spiracle fuscous. *Head* rather densely dusted brown-grey; eyes practically bare, separated by $\frac{1}{15}$ head-width, interfrontalia narrowly band-shaped on upper half, somewhat triangularly dilated to lunula, parafrontalia linear, slightly widened below, with a dense row of 8–10 equal inclinate (and more or less reclinate) setae on lower two-thirds, ocellars moderately strong, verticals fine but distinguishable; parafacialia half, jowls almost twice, as wide as the slender third antennal segment, the latter falling short of mouth-margin by fully its own width; arista with rather sparse long rays, only 7–8 on each of the dorsal and ventral surfaces, apical third almost bare, longest rays two-and-one-half times as long as width of third antennal segment. *Thorax* not very thickly dusted pale grey, with the usual four dark vittae, which are overlaid with some fuscous dust, a wedge-shaped median vitta extending from scutellar suture forward; scutellum in posterior view with a broad fuscous median vitta and on each side an elongate pale grey-dusted triangle; *prsc* rather weak, 2+4 very strong *dc*. *Abdomen* not very thickly dusted grey, second and third segments dusted dark brown, except for narrow grey margins and a narrow grey median vitta, fourth apparently largely dusted brown; anterior two segments with strong lateral marginals, third with rather small lateral discals and a row of strong lateral marginals, fourth with a row of moderately strong discals and marginals. *Wings* brownish subhyaline with

light brown and testaceous veins; r_1 bare in type, slightly exceeding level of *r-m* which lies at almost three-fifths of discal cell, r_{4+5} conspicuously curved backwards and shallowly sinuous, *m* markedly upcurved at tip; *m-m* rather oblique and strongly concave outwardly. Calyptrae ochraceous-brown, upper one with brown border, lower one subopaque with pale brownish border and golden fringe. Halteres dull reddish-yellow. *Legs* slender and long; mid femur with a row of short erect *av* and *pv* setae on basal half, these rows continued to apex as rows of decumbent long setulose hairs, mid tibia with 3 *p* setae, the most distal one smaller; hind femur with a complete row of moderately strong *av* setae, of which 2 near apex are stronger, and without *pv* setae, hind tibia with an *ad* seta at middle and 2 *av* slightly beyond.

Length.—9·9 mm., of wings *c.* 9·4 mm.

Distribution.—MALAYA: S. Bestam, Perak, 4,800 ft., IX. 1922 (*E. Seimund*), ♂ type in B.M.

206. **Xenosina pudica rufomarginata** Malloch.

1925. ! *Xenosina pudica* var. *rufomarginata* Mall., *Philipp. J. Sci.*, **XXVI**, 509 ♂ ♀; 1922, *Ann. Mag. n. H.* (9), **X**, 574 (as *Xenosia ungulata* (Stein)); *ibid.* (10), **XVI**, 227. Type: Mount Maquiling, Luzon. Mus. Washington? paratype in B.M.

Fuscous-black, rather densely dusted grey, margins of scutellum, apex of fourth tergite and the entire legs pale ferruginous, only coxae more or less darkened; antennae pale ferruginous, third segment somewhat darkened, palpi dark brown. *Head* moderately densely dusted grey and brownish-grey; eyes practically bare; contiguous in male with the anterior facets enlarged, interfrontalia obsolete on upper three-fifths, visible as a not very broad triangle below, parafrontalia linear or almost so, slightly widened in front, where 4–6 moderately strong inclinate setae are present, which become gradually smaller above, ocellars moderately strong, verticals small and rather indistinct; frons of female a quarter head-width at vertex, very slightly dilated with almost straight sides to lunula where it is almost three-tenths head-width, frontal triangle dusted grey, very elongate and narrow, reaching lunula, interfrontalia slightly narrowed at extremities, four times as wide at middle as a parafrontale, the latter with 5–6 moderately strong inclinate setae on anterior two-thirds, and with proclinate black setulae on outer part,

ocellars and verticals strong; parafacialia almost half, jowls one-and-one-half times, width of third antennal segment, the latter falling short of mouth-margin by more than its own width; arista long-plumose, longest rays fully twice as long as width of third antennal segment. *Thorax* with rather dense pale grey, behind suture more cinereous-grey and on disc brownish, dust, the four vittae only indicated by suffusedly and slightly darker dust, the paramedian vittae, however, fuscous, linear behind neck; *prsc* moderately strong, 2+4 strong *dc*. *Abdomen* densely dusted pale grey to cinereous-grey; second segment with some lateral marginals, third with several lateral discals and a complete row of rather strong marginals, fourth with a row of strong discals and marginals. *Wings* greyish subhyaline, hardly brownish, with ochraceous veins; r_1 setulose from behind *h* to apex, somewhat exceeding level of *r-m*, which lies at three-fifths of discal cell; r_{4+5} somewhat curved backward, very shallowly sinuous, *m* conspicuously upcurved at tip; *m-m* rather oblique and sinuous, less so in female. Lower calyptra subopaque, greyish, slightly browned, with brownish-grey border and pale golden fringe. Halteres pale reddish-yellow. *Legs:* Mid femur as in *tarsalis*; hind femur with a complete row of rather strong *av* setae of which 3–4 (♂) or 2–3 (♀) near apex are somewhat stronger, and with a few half-erect setulose *pv* hairs, hind tibia with 2 *av* and 2 *ad* setae, which are almost equal in length.

Length.—7·3–8·8 mm., of wings 6·4–7·0 mm.

Distribution.—PHILIPPINE ISLANDS: Luzon (type loc.). CEYLON: Pankullam (paratype) '*rufomarginalis*'; in B.M.; Kandy; Peradeniya; Rajakadaluwa; Belihul Oya; Welimada. SIAM: Biserat, paratype; in B.M.

Both specimens in the B.M. studied by Malloch are males and have no trace of the anterior *ia*. There is, however, in the B.M. a female identified by Stein as *arminervis* Stein from CEYLON: Peradeniya II.08 (*Brunetti*; see *Ann. Mus. nat. Hungar.*, **XVI**, 1918, p. 169). This female is traced to the present form in the keys, and its characters are those of the female in the above description, but it has a quite conspicuous small anterior *ia*. The under side of r_1 is bare but the upper side densely setulose almost to apex. It is very greasy and almost certainly not *arminervis*, since the type of the latter has pale shoulders and was found in New Guinea (Hüon Gulf). A few specimens have the fourth tergite wholly dark. The type form was described by Stein from Formosa.

207. **Xenosina flavipennis** (Malloch).

1928. ! *Pahangia flavipennis* Mall., *Ann. Mag. n. H.* (10), II, 311 (♂). Type: Gunong Benom. B.M.

Piceous-black with pale ferruginous tibiae and, in male, femora; fore femora of male slightly browned, femora of female brown, tarsi of male piceous, of female pale ferruginous, second antennal segment of male brown, of female brownish-orange. *Head* rather densely dusted brownish-grey, parafacialia and parafrontalia mostly with silver-white dust; eyes almost bare, in male contiguous to subcontiguous, interfrontalia obsolete for a very short distance above middle, visible as a small triangle in front of ocelli and as a moderately large one behind lunula, parafrontalia linear, slightly wider in front, with 5–6 subequal inclinate setae on anterior half and a conspicuous reclinate seta in front of ocelli, ocellars moderately strong, verticals fine and not clearly differentiated; frons of female at vertex less than a quarter (0·23) head-width, moderately dilated with the sides slightly concave towards lunula, where it is three-tenths head-width, frontal triangle moderately shining, narrowly drawn out from middle of frons to lunula, interfrontalia markedly narrowed to extremities, 3·5 times as wide at middle as a parafrontale, the latter with four inclinate setae on just over anterior half and, to their outer side, a row of small black proclinate setulae, ocellars and verticals strong; parafacialia in type a third width of third antennal segment, in paratype and female only as wide as base of arista, jowls as wide as third antennal segment, the latter falling short of mouth-margin by its own, in female by half its own, width; arista rather densely long-plumose, rays becoming slowly shorter from middle onwards, longest rays 1½ (♀) –2 (♂) times as long as width of third antennal segment. *Thorax* with three rather densely pale dusted vittae on disc, which have the front end rounded, the outer ones, on the line of the *dc*, slightly diverging forward, otherwise with only some dust on shoulders, notopleura, pleurae, etc., scutellum rather densely dusted, in posterior view with a broad undusted median vitta; *prsc* absent (type) or small, 2+4 strong *dc*. *Abdomen* of male rather glossy, not very densely dusted grey and brownish-grey, a narrow basal band on the second and third, and the whole of the fourth segment dusted slightly more densely and more grey, abdomen of female glossy, thinly and evenly dusted brown; anterior segments with well-developed lateral marginals, second also with 1–2 lateral discals, third with strong lateral discals and a row of strong marginals, fourth with a row of strong discals

and marginals; all setae much weaker in female. *Wings* subhyaline with a brownish tinge, base conspicuously ochraceous, veins pale testaceous; r_1 slightly exceeding level of *r-m*, which lies well beyond middle of discal cell; dorsal surface of r_{4+5} setulose about half-way to *r-m* (♂) or to level of *m-m* (♀), apex shallowly sinuous and slightly curved backward, apex of *m* slightly upcurved; *m-m* rather upright, somewhat concave outwardly. Lower calyptra subopaque, greyish-brown to brownish-grey with pale brownish-grey border and golden fringe. Halteres dull reddish-yellow. *Legs:* The erect *av* setae of the mid femur rather short and closely placed, 6–8 (♂) or 4–5 (♀) present on basal third, *pv* surface of mid femur with the usual row of stronger setae; hind femur with a row of moderately strong (in ♀ weak) *av* setae, the apical 3–4 (♂) or 2–3 (♀) being conspicuously stronger; hind tibia with only one *ad* and one *av*.

Length.—5·5–7·7 mm., of wings 5·7–7·5 mm.

Distribution.—MALAYA: Gunong Benom, Pahang, 5,000 ft. (type; in B.M.); Cameron Highlands, Pahang, 5,100 ft. (paratypes); Fraser's Hill, 4,000 and 4,200 ft.

I have seen a male and female from Fraser's Hill, the female bearing Malloch's label '*Xenosina biseta* Type' (undescribed as far as I am aware) and having r_1 setulose on intermediate third, whilst it is quite bare in the two males studied by me.

208. **Xenosina ruficollis** sp. n.

(Fig. 106*c*)

♂ ♀: Proboscis, thorax and legs pale ferruginous, but tarsi piceous, head and abdomen fuscous, palpi reddish at base. *Head* moderately densely dusted pale grey, parafacialia and parafrontalia with some silver-white dust; eyes thinly short-haired, in male subcontiguous, separated by $\frac{1}{15}$ head-width, interfrontalia dull black, conspicuous and band-shaped even near middle, parafrontalia linear, slightly widened in front, with about 8 inclinate setae extending from lunula to the reclinate seta and becoming much smaller near and above middle, ocellars rather strong, verticals moderately long but hardly differentiated; frons of female more than a quarter (0·27) head-width at vertex, moderately dilated with almost straight sides to lunula, where it is almost a third head-width, frontal triangle somewhat shining, narrow and drawn out almost to lunula, interfrontalia slightly narrowed to extremities, more than four times as wide at middle as a parafrontale, the latter on anterior three-fifths with 3 strong and 2 small inclinate setae arranged somewhat alternatively, and

on outer part with a row of proclinate black setulae, ocellars and verticals strong; parafacialia less than a third, jowls fully, width of third antennal segment, the latter falling short of mouth-margin by half (♂) or a third (♀) its own width; arista moderately densely long-plumose, the rays slowly becoming shorter from middle onwards, longest rays almost twice as long as width of third antennal segment. *Thorax* with thin whitish dust forming 3 not very broad vittae, which are conspicuous behind neck but inconspicuous behind suture, where there is another pair of faint vittae from the suture to the *ia*, another pair of broader irregularly defined vittae from shoulder to base of wing; the resulting undusted vittae rather broad, *prsc* indistinct (♂) or very weak (♀), 2+4 very strong *dc*, *pra* distinct. *Abdomen* moderately densely dusted brownish-grey, somewhat shining, in some directions appearing piceous in female, in male more brown dusted on intermediate segments and base of fourth; anterior segments with strong lateral marginals and less strong lateral discals, third with strong lateral discals and a row of strong marginals, fourth with a row of strong discals and marginals; in female all setae much weaker, especially those of anterior segments. *Wings* subhyaline with a slight brownish, and towards base brownish-ochraceous, tinge, veins brown to light brown; r_1 slightly exceeding *r-m*, which lies well beyond middle of discal cell, with setulae on intermediate third of dorsal surface, r_{4+5} somewhat curved backward and shallowly sinuous, *m* markedly upcurved at tip; *m-m* somewhat oblique and sinuous in male, slightly oblique and outwardly concave in female. Lower calyptra brownish-ochraceous, subopaque, with whitish-brown border and golden fringe. Halteres reddish-yellow. *Legs:* Mid femur with half-erect short *av* setae on less than basal half and decumbent *av* setulae from there to apex, in female this row is much less conspicuous and the half-erect setae are reduced to 4–5 on basal third, the *pv* surface with a row of about 6 much stronger setae in basal half, which is continued to apex by a dense row of setulose hairs; hind femur in male with an *av* row of short setulae in basal half and longer ones on apical half, 2–3 near apex being much stronger, in female only a few setulae and 2 setae near apex distinct, hind tibia with 2 *ad* and 1 *av* seta.

Length.—6·5–7·3 mm., of wings 5·8–7·9 mm.

Distribution.—S. INDIA: Kodaikanal, 7,000 ft., 23.III.36 (*B.M.-C.M. Exped. to S. India, 1936*), ♂ type (in B.M.); Shembaganur nr. Kodaikanal, 6,000 ft., 30.III.36, 1 ♀ paratype (in Colombo Mus.).

The type is the larger specimen.

209. **Xenosina morosa** (Stein).

1918. *Mydaea morosa* Stein, *Ann. Mus. nat. Hungar.*, **XVI**, 170, 186 ♂ Type: Ohiya. Mus. Calcutta?
1922. *Xenosina morosa* (Stein), Mall., *Ann. Mag. n. H.* (9), **X**, 574, ♀
1925. *Xenosina morosa* (Stein), Mall., *Philipp. J. Sci.*, **XXVI**, 509, 510; 1935, *Ann. Mag. n. H.* (10), **XVI**, 227; Hennig, 1952, *Beitr. Ent.*, **II**, 86.

Wholly piceous or fuscous-black, very finely but rather densely dusted whitish, the dust producing bluish or purplish reflections, vittae very faint, legs wholly pale ferruginous, only the distal 1–2 tarsal segments slightly browned. *Head* dusted whitish-grey; eyes thinly haired, in male subcontiguous, interfrontalia everywhere distinct as a narrow black vitta, parafrontalia linear, somewhat broadened towards lunula, with a continuous row of long but mostly rather fine inclinate setae between the lowest and strongest inclinate and the long and rather strong reclinate seta, ocellars rather strong, verticals fine but long; frons of female more than a quarter (0·26–0·27) head-width at vertex, moderately dilated with almost straight sides to lunula, where it is a third head-width or wider (0·33–0·35), frontal triangle slightly shining, thinly dusted grey at sides, narrowly drawn out to lunula, interfrontalia very slightly narrowed at extremities, four times as wide at middle as a parafrontale, the latter on more than anterior half with 4–5 strong reclinate setae and between them 1–2 setulae, ocellars and verticals strong, parafacialia a third to a quarter (but in profile linear), jowls one-and-a-half times, width of third antennal segment, the latter falling short of mouth-margin by half its own width; arista with moderately dense rays, which become shorter from second fifth onwards, longest ones half as long again as width of third antennal segment. *Thorax* with rather small *prsc* and 2+4 very strong *dc*; auxiliary prostigmal hair-like. *Abdomen* rather shining, evenly dusted, anterior segments with conspicuous lateral marginals, second and third with conspicuous lateral discals, third and fourth with strong marginal rows, fourth also with a row of strong discals. *Wings* greyish subhyaline, somewhat ochraceous at base and along front margin, veins light brown to brown; r_1 reaching level of *r-m*, which lies somewhat beyond middle of discal cell, r_{4+5} rather sinuous and converging with *m*, which is conspicuously upcurved at apex; *m-m* slightly oblique and rather concave outwardly. Lower calyptra subopaque, greyish-ochraceous with paler border and golden fringe. Halteres pale reddish-yellow. *Legs:* Mid femur of female (of male not available)

with 3–5 rather strong *a.* setae at middle, 6–8 small erect *av* setae and 5–6 strong *pv* setae on basal half, the *av* and *pv* rows continued to apex as decumbent longish setulose hairs; hind femur with a complete row of rather short and fine *av* setae, 2–3 near apex becoming strong and long, without any *pv* setae, hind tibia with (1–)2 *ad* and 1 *av* seta near middle.

Length.—*c.* 7–8·5 mm., of wings 7·3–8·7 mm.

Distribution.—CEYLON: Ohiya (Type); Nuwara Eliya; Nanu Oya.

In all four specimens seen the second third of r_1 is setulose on dorsal surface; in two of the specimens the setae on dorsal surface of r_{4+5} extend about half-way to *r-m*.

210. **Xenosina canoapicata** sp. n.

♂ ♀: Fuscous-black, scutellum pale ferruginous with the base infuscated dorsally, postalar callosity, periphery of shoulder callosity and pleural sutures conspicuously ferruginous, antennae brownish-orange, the third segment (at least in male, of female unknown) pale yellowish-orange, legs wholly pale ferruginous, tarsi slightly browned at tips. *Head* dusted greyish-brown with golden-whitish parafacialia and parafrontalia ; eyes practically bare, in male contiguous, interfrontalia reduced to a minute triangle in front of ocelli and a small black triangle above lunula, parafrontalia sublinear, somewhat widened in anterior half where 4 moderately strong inclinate setae alternate with setulae, upper half bare except for the pair of rather small but quite conspicuous reclinate setae, ocellars strong, verticals short and indistinct; frons of female less than a quarter head-width at vertex (0·23), evenly dilated with almost straight sides to lunula where it is not quite three-tenths head-width, frontal triangle slightly shining, narrowly drawn out and disappearing towards lunula, interfrontalia slightly narrowed at extremities, thrice as wide at middle as a parafrontale, the latter with 3 strong inclinate setae, which alternate with setulae, on anterior half and with 2 small ones above them, outer part with a row of proclinate black setulae, ocellars and verticals strong; parafacialia a third, jowls fully, width of third antennal segment, the latter falling short of mouth-margin by almost its own width, arista long-plumose, its rays becoming rather quickly shorter from middle onwards, longest rays twice as long as width of third antennal segment. *Thorax* rather densely dusted whitish-grey on disc, the dust in male brownish near median line, paramedian vittae narrow in

front, gradually somewhat broadened behind suture, parallel, a narrow streak present between the *dc* and the line of the *ia* and a broad fuscous vitta over the *ph*, *prst* and *sa*, its inner border reaching the line of the *ia*; *prsc* rather small, 2+4 very strong *dc*; auxiliary prostigmal hair-like. *Abdomen* moderately shining, especially on second and third tergites, apex of fourth somewhat pale ferruginous in ground-colour; anterior segments with distinct lateral marginals and discals, third with lateral discals and a row of strong marginals, fourth with a row of strong discals and marginals. *Wings* subhyaline with a slight brownish tinge, base conspicuously ochraceous, veins brightly ochraceous at base, somewhat darker apically, r_1 setulose from node to apex on dorsal surface and with some odd setulae on under side, especially towards apex, r_{4+5} setulose almost to *r-m* (type), r_1 slightly exceeding level of *r-m*, which lies well beyond middle of discal cell, r_{4+5} and *m* converging at apex, r_{4+5} rather strongly curved back and sinuous, *m* somewhat upcurved; *m-m* slightly oblique, somewhat concave outwardly. Calyptrae brownish-ochraceous, in female somewhat paler, the lower one subopaque, border somewhat paler, with pale golden fringe. Halteres pale reddish-yellow. *Legs:* Mid femur as in the preceding species, mid tibia with 4–5 *p* setae; hind femur with a complete row of *av* setae, which are much shorter on basal half, especially in female, 5–6 (♂) or 2–3 (♀) setae near base strong, *pv* surface without distinct setae, hind tibia with 1 *av* and 2 *ad* setae.

Length.—7·7–8·8 mm., of wings 7·4–8·6 mm.

Distribution.—MALAYA: Cameron Highlands, Pahang, 4,800–5,500 ft., 8.VI.35 (*H. M. Pendlebury*), ♂ type (in B.M.). N.E. BURMA: Kambaiti, 2,000 m., 25.V.34 (*R. Malaise*), 1 ♀ paratype (in Mus. Stockholm).

211. **Xenosina lauta** (Stein).

1918. *Mydaea lauta* Stein, *Ann. Mus. nat. Hungar.*, **XVI**, 152, 186. Type: Hong Kong. Mus. Berlin.
1925. *Xenosina lauta* (Stein), Mall., *Philipp. J. Sc.*, **XXVI**, 509; 1935, *Ann. Mag. n. H.* (10), **XVI**, 228.

Fuscous, with pale ferruginous legs, but tarsi browned or piceous; in male fore coxa and much of mid coxa piceous-brown and fore femur suffusedly browned along dorsal surface, in female lower edge of scutellum somewhat testaceous translucent. *Head* moderately densely dusted whitish-grey, parafacialia and parafrontalia almost silver-white; eyes almost

bare, in male subcontiguous, separated by about a fifteenth (0·06–0·09) head-width, interfrontalia forming a complete black vitta, which is very narrow or linear just above middle, slightly widened to ocelli and moderately to lunula, parafrontalia linear, slightly widened to lunula, on anterior three-fifths with 5–7 strong and 3–1 small inclinate setae, on fourth fifth with 1–2 widely spaced fine hairs, which bridge the gap between the inclinate setae and the small but conspicuous reclinate one, ocellars moderately strong, verticals rather indistinct; frons of female over a quarter (0·26–0·27) head-width at vertex, moderately dilated with straight sides to lunula where it is about one-third (0·32–0·36) head-width, frontal triangle with thin brownish dust, somewhat shining and fading out at lunula, interfrontalia slightly narrowed at extremities, about four times as wide at middle as a parafrontale, the latter with 3–4 strong and, alternating with them, 2–3 weak inclinate setae, ocellars and verticals strong; parafacialia about a quarter (♂) or sixth (♀), jowls one-and-a-half times (♂) or just (♀), width of third antennal segment, the latter falling short of mouth-margin by half its own width; arista rather densely long-plumose, the rays slowly becoming shorter from middle onwards, the longest almost or fully twice as long (♂) or half as long again (♀) as width of third antennal segment. *Thorax* moderately densely dusted whitish-grey, the dust more brownish on median posterior part, vittae conspicuous, the paramedian ones narrow, the outer ones broadly interrupted, broad and patch-like in front of suture and continued as two narrow vittae behind suture; *prsc* rather weak, 2+4 strong *dc*; anterior thoracic spiracle fuscous. *Abdomen* moderately densely dusted grey, intermediate tergites in male each with a pair of large suffused brown-dusted spots and a linear grey median vitta, in female intermediate tergites and most of first uniformly glossy piceous, thinly dusted brown; setae as in *canoapicata*, but lateral discals of anterior segments rather indistinct. *Wings* greyish subhyaline, the base slightly ochraceous, veins ochraceous at base, more brownish on apical half; r_1 bare on under side (in one ♀ with a single setula at middle on each side), but setulose on middle third of dorsal surface, r_{4+5} with a few setulae on node, which on dorsal surface, may extend almost half-way to *r-m* or further; r_1 reaching or slightly exceeding level of *r-m*, which lies well beyond middle of discal cell, r_{4+5} and *m* as in *canoapicata*, *m-m* in male as in *canoapicata*, in female almost straight and rather upright. Calyptrae greyish-white with concolorous border and yellowish-white fringe. Halteres pale reddish-yellow. *Legs* as in *canoapicata* except

for the colouration of the tarsi and in male of the anterior coxae, hind coxa of male and trochanters slightly browned.

Length.—4·8–6·4 mm., of wings 4·6–6·0 mm.

Distribution.—FORMOSA. HONG KONG. N.E. BURMA (Kambaiti).

All specimens have several setulae on intermediate part of r_1 and none or (type) only one or two on apical part, whilst in the two available specimens of the closely related and similar *X. canoapicata* both the intermediate and the apical parts are conspicuously setulose.

Stein described the species from Formosan specimens in the Budapest Museum and added: 'In der Brunettischen Sammlung finden sich einige Stücke aus Hong Kong III.06.' Through the kindness of Prof. Peus I have been able to study the two specimens with these data retained by Stein in his collection and marked 'Type'. One of these is *Helina* (*Helinella*) *lenticeps* Thoms., the other the present species. As Stein's description applies only to the latter specimen, I select this as the type of *lauta*, the specimens from Formosa in the Budapest Museum having recently been destroyed. The Kambaiti males tally perfectly with the Hong Kong one, except for the following slight differences: the tarsi are darker, the vittae of the mesonotum are even somewhat narrower and appear fuscous and undusted in posterior view as do to a lesser extent the paired spots on the intermediate abdominal segments on either side of the median vitta, the pattern being brown-dusted in the type; the abdominal spots are in addition extended outward by a brown-dusted area in the Kambaiti males.

212. **Xenosina solennis** (Walker).

1857. !*Hydrotaea solennis* Walk., *J. Proc. Linn. Soc.*, I, 27. ♂. Type: Mt. Ophir. B.M.

1901. *Spilogaster solennis* (Walker), Stein, *Zeit. Hymen. Dipt.*, I, 209.

1918. *Mydaea solennis* (Walker), Stein, *Ann. Mus. nat. Hungar.*, XVI, 181.

Piceous-black to piceous with brown trochanters, piceous-brown femora and testaceous tibiae; fore tibia and the bases of the other ones somewhat browned; palpi and third antennal segment fuscous. *Head* not very densely dusted cinereous-grey, clypeus, parafacialia and anterior part of parafrontalia somewhat more densely dusted silver-grey, in female upper two-thirds of parafrontalia dusted ashy-golden; eyes practically bare, in male contiguous, interfrontalia obsolescent

above middle and forming a very narrow elongate small triangle above and a not very large nor very broad triangle at lunula, parafrontalia linear, somewhat broader on anterior third, with a continuous row of about 12 inclinate setae from lunula to ocelli, the uppermost 1–2 reclinate and slightly stronger than the preceding ones, ocellars rather strong (judged from pores), verticals indistinct; frons of female less than a quarter (0·22–0·24) head-width at vertex, rather strongly or moderately dilated with almost straight sides to lunula, where it is about three-tenths (0·32–0·29) head-width, frontal triangle poorly defined, somewhat brown-dusted and slightly shining, very elongate and fading out at lunula, interfrontalia dull piceous-black, somewhat narrowed at extremities, five times as wide at middle as a parafrontale, the latter on lower three-fifths with 4–5 strong and, between and above them, 2–3 small inclinate setae, on outer part with a row of very fine proclinate black setulae; parafacialia (in anterolateral view) about one-third, jowls one-and-one-third, width of third antennal segment, the latter not quite reaching mouth-margin; arista moderately densely long-plumose, the rays becoming shorter from basal third onwards, longest rays one-and-two-thirds as long as width of third antennal segment. *Thorax* moderately densely dusted, the pollinosity whitish-grey in front and on much of *dc* strip but brownish between the conspicuous paramedian vittae (except near neck) and outward to the outer vittae; paramedian vittae narrow but somewhat broadened behind, reaching the rather weak *prsc*, outer vittae patch-like in front of suture, broadly interrupted at suture and separated into two vittae behind suture; 2+4 strong *dc*. *Abdomen* as in *kambaitiana*, but in female first segment wholly glossy piceous, and fourth narrowly glossy piceous at base and with a moderately broad glossy piceous median vitta. *Wings* subhyaline, conspicuously ochraceous at base, otherwise with a brownish-ochraceous tinge, veins pale testaceous with ochraceous bases; r_1 setulose on dorsal surface of middle and apical parts and with a few setulae on under side of at least apical part, r_{4+5} setulose to about *r-m* or even level of *m-m*; r_1 slightly exceeding level of *r-m*; which lies well beyond middle, in male at almost two-thirds, of discal cell, r_{4+5} and *m* as in *canoapicata*, *m-m* slightly oblique in male, almost upright in female, somewhat concave outwardly. Calyptrae yellowish-grey (♂) or pale brownish-grey (♀) with somewhat more whitish border and whitish (♂) or pale golden (♀) fringe. Halteres dull reddish-yellow. *Legs:* Basal two-fifths of front femur in male with rather numerous erect short stiff hairs, mid femur

as in the preceding species but the erect setae less numerous, mid tibia with 2 *p* setae, hind femur and hind tibia (missing in type) as in the preceding species, but the former in female with 4 strong *av* near apex.

Length.—5·7–6·7 mm., of wings 5·1–5·7 mm.

Distribution.—MALAYA: Mt. Ophir, Malacca (type; in B.M.); Fraser's Hill (in B.M. and Fed. Malay States Mus.).

In 1901 Stein declared Walker's species to be identical with his *Spilogaster setinervis* (1900, *Ann. Mus. Genova*, **XX**, p. 385) from Neu-Pommern, but in view of the great similarity of many species in this genus this synonymy can hardly be considered as certain.

213. **Xenosina dissimilis** sp. n.

♂: Pale ferruginous with rufous mesonotum and scutellum, head reddish-fuscous, antennae and palpi testaceous, posterior tibiae browned, tarsi dark brown, third and fourth abdominal segments piceous with extreme base of third and tip of fourth somewhat paler, posterior third of second strongly browned. *Head* rather densely dusted brown-grey, clypeus and facial ridges dusted pale yellowish-grey, somewhat pale translucent; eyes virtually bare, closely contiguous, upper anterior facets enlarged, interfrontalia obsolete in second third, vestigial in front of ocelli and forming a not very broad rufous-brown triangle in anterior third, parafrontalia linear, slightly broadened in anterior two-fifths, with a complete row of about 12 fine inclinate setae from lunula to almost anterior ocellus, only the anterior 2–3 setae being moderately strong, the setae interspersed with a few setulose hairs; ocellars moderately strong, verticals fine but rather distinct; parafacialia slightly more than a quarter, jowls twice, width of third antennal segment, the latter falling short of mouth-margin by half its own width; arista rather densely long-plumose, rays very slowly decreasing in size from basal fourth almost to apex, the longest ones almost twice as long as width of third antennal segment. *Thorax* above neck with a rather thinly pale brownish dusted spot, which is delimited laterally by the paramedian vittae, and which is divided by a linear undusted median vitta, in addition some pale dust on lateral parts of mesonotum; in certain directions at a sharp angle with the light beam the whole surface is seen to be thinly dusted pale brown; *prsc* moderately strong, *pra* stronger than second *npl*; auxiliary prostigmal distinct but not very strong. *Abdomen* subcircular-cordate, glossy, appearing undusted in posterior view; anterior segments with rather

strong lateral marginals, third with 3–4 lateral discals and a complete marginal row, fourth with a complete discal and marginal row, these setae are not very strong but quite long and erect. *Wings* subhyaline with a conspicuous ochraceous tinge, veins brown with testaceous bases; r_1 setulose on dorsal surface of intermediate section and proximal part of apical section, r_{4+5} setulose almost to *r-m* on under side but only a third or half-way to *r-m* on upper side; r_1 exceeding level of *r-m*, which lies at three-fifths of discal cell and is very slightly suffused, r_{4+5} and *m* not markedly converging at apex, r_{4+5} very shallowly sinuous, somewhat curved backward, *m* only very slightly upcurved at extreme tip; *m-m* slightly oblique and somewhat sinuous. Lower calyptra pale brownish-ochraceous with pale brownish border and pale golden fringe. Halteres dull brownish-yellow. *Legs* without unusual characters (mid legs missing in type); hind femur with 3 strong *pv* setae in basal half and with an *av* row, which is composed of rather short and fine setae on basal half and four strong setae on apical half, all these tending to alternate with slightly lengthened setulose hairs, hind tibia with 1 *ad* slightly beyond middle and 3–4 *av* setae on about intermediate third.

Length.—6·7 mm., of wings 7·2 mm.

Distribution.—MALAYA: Simgai Parang Path, Cameron Highlands, 4,850 ft., 25.V.31 (*H. M. Pendlebury*), ♂ type.

The type is labelled '*Xenosina dissimilis* Type, det. J. R. Malloch', but the species has apparently not been described. Apart from *sordida* Stein, it is the only species in the genus with only three *post dc.*

214. **Xenosina sordida** (Stein).

1910. ! *Spilogaster sordida* Stein, *Ann. Mus. nat. Hungar.*, VIII, 550. Type: Matheran. Mus. Berlin.
1918. *Mydaea sordida* (Stein), Stein, *Ann. Mus. nat. Hungar.*, XVI, 184.

Pale ferruginous with fuscous head, the mesonotum infuscated, except laterally, and rather densely dusted whitish-grey, abdomen piceous except for first segment and base of second; antennae (♂) and palpi orange-yellow, tarsi somewhat browned, especially at apex. *Head* rather densely dusted brownish-grey, parafacialia, clypeus and parafrontalia silver-grey; eyes of male closely contiguous, practically bare, anterior upper facets strongly enlarged, interfrontalia, parafrontalia, ocellars and verticals as in *dissimilis*, but parafrontalia with only six inclinate setae, which alternate with three setulae; parafacialia a quarter, jowls twice, width of third

antennal segment, the latter falling short of mouth-margin by almost its own width; arista densely long-plumose, longest rays twice as long as width of third antennal segment. *Thorax* without a linear undusted vitta, the paramedian vittae widely separated, linear and fuscous in front of suture, twice as broad, brown-dusted and not very conspicuous behind suture, the outer vittae brown and broadly interrupted at suture, the dust to their outer side brownish-yellow; *prsc*, both *ia*, *pra* and second *npl* subequal, moderately strong; auxiliary prostigmal very distinct. *Abdomen* very short-ovate, posterior segments rather densely dusted grey, third segment with a very faint suffused spot at each side of a grey-dusted median vitta, this spot indistinctly extended behind fore margin to lateral surface, anterior segments with rather weak lateral marginals and discals, setae of posterior segments as in *dissimilis*. *Wings* greyish subhyaline, with testaceous veins, node, *r-m* and apical parts of veins browned; r_1 bare, setulae of r_{4+5} as in *dissimilis*; r_1 hardly reaching level of *r-m*, which is somewhat oblique and lies at three-fifths of discal cell, r_{4+5} and *m* conspicuously converging at apex, r_{4+5} shallowly sinuous and slightly curved backward, *m* markedly upcurved at apex; *m-m* rather oblique and convex in posterior part. Lower calyptra pale brownish-grey with pale brownish border and pale golden fringe. Halteres pale reddish-yellow. *Legs* without submedian setae on anterior tibiae except for the two *p* setae of the mid tibia, mid femur without an *a* pre-apical, with a row of weak and short *av* setae on less, and of slightly stronger but somewhat unequal *pv* setae on more, than basal half; hind femur with a row of 10 *av* setae, the distal 3–4 of which are stronger and somewhat more widely spaced, and with 5–6 *pv* setae on basal half, the distal ones being somewhat stronger, setae of hind tibia as in *dissimilis*.

Length.—6·0 mm., of wings 6·3 mm.

Distribution.—INDIA: Matheran, Bombay.

Redescribed from the type, which is apparently still the only specimen known.

215. **Xenosina orientalis** (Malloch).

1928. ! *Lasiopelta orientalis* Mall., *Ann. Mag. n. H.* (10), II, 309 (♂). Type: Bukit Kutu. B.M.

Pale ferruginous with the upper part of the head fuscous, mesonotum and scutellum rufous, and the abdomen uniformly glossy piceous, only the first segment and the extreme base of

the second slightly paler translucent; legs including tarsi pale ferruginous, only the last 1–2 tarsal segments somewhat browned, antennae and palpi pale orange. *Head* pale brownish translucent below, dusted pale brownish and whitish, anterior third of interfrontalia suffusedly rufous, posterior two-thirds fuscous; eyes practically bare, frons at middle $\frac{1}{7}-\frac{1}{8}$ head-width, like the interfrontalia slightly widened to vertex, somewhat more to lunula, parafrontalia narrow in upper two-thirds, somewhat widened below, with 5–6 rather strong inclinate setae, the last two stronger than the preceding two and somewhat reclinate, the setae mostly alternating with setulae, ocellars and verticals rather weak but distinct; parafacialia one-third, jowls one-and-a-half times, width of third antennal segment, the latter falling short of mouth-margin by almost half its own width; arista long-plumose, the rays becoming slowly shorter from basal third onwards, the longest ones half as long again as width of third antennal segment. *Thorax* with rather dense whitish dust, which behind suture is reduced to some narrow streaks and in front of suture to four conspicuous vittae (narrower than the five undusted rufous vittae) and the shoulders, etc.; *prsc* moderately strong but rather short, anterior *ia* stronger than posterior one, nearer level of first than to that of second *post dc*, *pra* as strong as second *npl*, auxiliary prostigmal distinct but not very strong; hypopleura with some hairs below and in front of spiracle and above hind coxa. *Abdomen* glossy, in antero-dorsal view (with the light coming from the front), thinly dusted brownish-grey; anterior three segments with distinct lateral marginals and with indistinct or not very distinct lateral discals, fourth with a row of strong discals and marginals. *Wings* greyish subhyaline with a slight yellowish tinge; veins pale testaceous, *r-m* strongly, *m-m* slightly, suffused, setulae on r_{4+5} extending half-way to *r-m*; r_1 exceeding level of *r-m*, which lies beyond middle of discal cell, r_{4+5} and *m* slightly converging at apex, r_{4+5} shallowly sinuous and somewhat curved backwards, *m* slightly upcurved at tip; *m-m* rather upright and straight. Calyptrae greyish-brown subhyaline, upper one with brown, lower one with brownish border and golden fringe. Halteres dull brownish. *Legs:* Mid femur with several irregular rows of longer erect *av* and *v* setulae and with 6–7 strong *pv* setae on just over basal half; hind femur with a complete *av* row consisting of 5–6 fine setae on basal part and 5 strong ones on slightly more than apical half, the distal 3 being especially strong, *pv* surface with 6 moderately strong setae on slightly

more than basal half, hind tibia with a strong *ad* at middle and with 5 rather strong *av* setae.

Length.—(Of both body and wing) 6·6 mm.

Distribution.—MALAYA: Bukit Kutu, Selangor, 3,500 ft.

If it were not for the differences in the male sex, *orientalis* would probably be regarded as a dark variety of *similis* (though nomenclaturally *orientalis* would have to be the type form). However, the wide male frons and the difference in the *pv* setae of the hind femora separate this species rather clearly. At present the type is the only known specimen; it has no setulae on r_1. The scutellum of the type is hairy at sides with a row of 4–5 black hairs just above ventral edge and parallel with it.

216*a*. **Xenosina similis** (Malloch).

1928. ! *Lasiopelta similis* Mall., *Ann. Mag. n. H.* (10), II, 310 (♂).
Type: Bukit Kutu. B.M.

Pale ferruginous, dorsum somewhat browned, head fuscous, face and jowls pale ferruginous translucent, abdomen with a suffused brown to piceous paramedian vitta and similar more or less broad hind margins on intermediate segments, fourth with a median vitta and the apical margin suffusedly pale, sometimes wholly pale, antennae and palpi pale orange, base of latter infuscated, legs pale ferruginous, but tarsi conspicuously piceous. *Head* moderately densely dusted brownish-grey with yellowish-white dust on clypeus, parafacialia and parafrontalia; eyes virtually bare, contiguous in male with markedly enlarged anterior facets, interfrontalia obsolete at and above middle, hardly visible near anterior ocellus, and forming a not very large rufous triangle above lunula, parafrontalia linear, slightly widened in front, with 4–5 more or less strong and 6–8 setulose inclinate setae, which almost reach anterior ocellus, verticals rather small but distinct; frons of female more than a quarter (0·26–0·29) head-width at vertex, parallel-sided to lunula, at which it is not quite three-tenths (0·28–0·29) head-width, frontal triangle dusted grey, well defined, elongate and almost reaching lunula, interfrontalia somewhat rufous translucent on anterior fifth, otherwise fuscous, somewhat narrowed to extremities, four times as wide at middle as a parafrontale, the latter on anterior three-fifths with 4–5 strong and, alternating with them, 4–3 weak inclinate setae and, on outer part, with a complete row of small black proclinate setulae, ocellars and verticals strong; parafacialia about a third, jowls in male twice, in female one-and-a-half times, width of third antennal segment, the latter

falling short of mouth-margin by half its own width; arista long-plumose, rays slowly decreasing in length from second fifth onwards, longest ones more than half as long again as width of third antennal segment. *Thorax* similar to that of *orientalis*, but the undusted vittae narrower, the *prst* median vitta sometimes faint, the pale grey dust behind suture delimiting a suffused pale ferruginous median vitta, a pair of rufous-brown paramedian vittae (to beyond second *post dc*), a rufous-brown vitta between the *post dc* and *ia* and a somewhat irregular one outward to the *ia*; *ia* subequal, anterior one nearer to level of second *post dc* than to that of first, second *post dc* somewhat shortened, auxiliary prostigmal conspicuous, hypopleura quite bare; scutellum bare near lower edge (though the setulae reach middle of lateral surface anteriorly and approach lower edge near tip). *Abdomen* as in *orientalis* except for the colouration. *Wings* subhyaline with a strong yellowish tinge, veins pale testaceous, *r-m* distinctly, *m-m* indistinctly, suffused; setulae on r_{4+5} extending in male a third (on under side half) the distance to *r-m*, in female to level of *m-m*; r_1 slightly exceeding *r-m*, which lies at almost three-fifths (♂) or beyond middle (♀) of discal cell, r_{4+5} and *m* as in *orientalis*, *m-m* somewhat concave exteriorly. Calyptrae and halteres as in *orientalis*, but lower calyptra more opaque. *Legs:* The *av* setulae of the mid femur not much longer in male, 4–5 strong (♂) or 1–3 weak (♀) setae on less than basal half; hind femur in both sexes with very short setae on basal and 3–4 strong and widely spaced ones on apical half and with 1–3 quite conspicuous *pv* setae on basal half, hind tibia with an *ad* at middle and 3–4 *av* setae.

Length.—6·6–7·7 mm., of wings 7·0–7·4 mm.

Distribution.—MALAYA: Bukit Kutu, Selangor, 3,500 ft.; Fraser's Hill, Pahang, 4,000 ft.; Kota Tinggi, Johore.

In the type r_1 is bare, but in the two females it is setulose on intermediate section or on this and basal part of apical section. In the Kota Tinggi female the hind tibiae are strongly browned.

216*b*. **Xenosina similis septentrionalis** ssp. n.

♂ ♀: Very similar to *similis* Mall. but paler, the suffused dark pattern of the abdomen and the pale median vitta and pale bases of the segments from the dark paramedian vitta to the lateral surface more conspicuous; palpi not infuscated at base; tarsi conspicuously browned but not piceous. Frons of female broader, about three-tenths (0·29–0·32) head-width at vertex, somewhat convex laterally and usually slightly

narrowed from there almost to lunula, a third (0·31–0·35) head-width at lunula. Auxiliary prostigmal hair-like; scutellum with a group of black setulose hairs at or near ventral edge at about middle of length. Wings as in the type form, but setulae on r_{4+5} in some females extending only as far as in male.

Distribution.—INDIA: Shillong, Khasia Hills, 3.X.20 (*R. Senior White*), ♂ type (in B.M.), 6.X.20 ♀ paratype (in B.M.); Darjeeling, 7,000 ft., 26.V.10 (*E. Brunetti*), 3 ♀ paratypes (2 in Mus. Calcutta). N.E. BURMA: Kambaiti, 1,800–2,000 m., 24.V–17.VI.34 (*R. Malaise*), 1 ♂ paratype (in Mus. Stockholm), 12 ♀ paratypes (in Mus. Stockholm, Helsinki, B.M.).

The dorsal surface of r_1 is normally bare, but in two female paratypes from Kambaiti and that from Shillong the intermediate section is setulose.

Genus 34. **Mydaea** Robineau-Desvoidy.

1830. *Mydaea R.-D., Myod.*, 479. Type: *M.* (*scutellaris* R.-D. =) *pagana* F.

1856. sbg. *Myiospila* Rond., *Dipt. ital. Prodr.*, I, 91 (*Myiospila*). Type: *Musca meditabunda* F.

1926. sbg. *Eumyiospila* Mall., *Philipp. J. Sci.*, XXXI, 499; Mall., 1928, *Ent. Mitt.*, XVII, 314. Type: *E. spinifemorata* Mall.

1928. *Pendleburyia* Mall., *Ann. Mag. n. H.* (10), II, 312. Type: *M. longicornis* Stein, n. syn.

1935. *Eumydaea* Karl, *Arb. morph. taxon. Ent.*, II, 41. Type: *Aricia argentata* Walk., n. syn.

Head about twice as high as long; eyes of male as a rule more or less closely approximated (but in *longicornis* and *secunda* widely separated); frons of female broad without cruciate interfrontal (except in *meditabunda*) or proclinate orbital setae; arista plumose. *Thorax* with more or less dense pale dust and four or five dark vittae, *pra* more or less distinct; prosternum, propleural depression and pteropleura bare; 1+2 or 2+2 *stpl*; metathoracic spiracle without black setulose hairs; infrasquamal hairs absent. *Abdomen* rather dark and broad, without well-developed median setae on anterior segments. *Wings* with conspicuously sinuous *sc*, which is rather steeply upcurved in apical part; r_1 bare, r_{4+5} setulose on both dorsal and ventral surfaces, at least on basal node; sixth vein not reaching margin. Lower calyptra strongly rounded at apex, inner margin diverging from longitudinal axis of body (and from lateral margin of scutellum) from base onwards. *Legs* not very slender; fore tibia normally without a *p* seta (in Oriental species); mid femur with an *a* pre-apical;

hind tibia with a well-developed *ad* pre-apical close to the *d* one.

Distribution.—The genus occurs in the HOLARCTIC, NEOTROPICAL, ETHIOPIAN and ORIENTAL REGIONS and extends to NEW GUINEA, at least if *Eumyiospila* is included, but it does not appear to be found in AUSTRALIA or on the PACIFIC ISLANDS.

Biology.—European species (of both *Mydaea* s. str. and sbg. *Myiospila*) as adults are attracted to cattle droppings in the field, on which the eggs are deposited. They are of the flanged type (Fig. 8*u*), and, according to Thomson (1937, *Parasitol.*, **XXIX**, p. 309), who has described the developmental stages and biology in detail, the hatching larvae are already in the second or, in some species, third stage. The second stage—unless it is spent in the egg—is coprophagous and lasts only a few hours to a day or two, but the third is carnivorous and entirely dependent on living prey, especially larvae of *Orthellia*, *Haematobia*, *Dasyphora* and their own species. After a few days pupation takes place in the soil, and, unless diapause occurs, the fly hatches after another few days. The biology of subgenus *Eumyiospila* is possibly different, as a specimen collected by Jacobson is labelled 'larva in inflorescence of Scitamineae' (Malloch, 1928), and as C. K. Samuel bred a female from a larva found in a guava.

Myiospila has often been treated as a separate genus and sometimes even included in *MUSCINAE* because of the curvature of *m*, but this character is not now considered to be very important, and the only character which gives *meditabunda* a somewhat isolated position in this genus is the cruciate interfrontal setae. However, this character is found in only a few species and is sometimes variable in a species, so that I see no reason for giving *Myiospila* generic status. *Pendleburyia* is even less clearly defined; *Eumyiospila* can easily be distinguished from other Oriental *Mydaea* by the single *ad* seta of the hind tibia, but this character is found in many non-Oriental *Mydaea*, and the characters used by Malloch for separating the group are too variable. The genotype of *Eumydaea* Karl, 1935, is *argentata* Walk., the type of which is in the B.M. and is a male; it has all the characters of *Eumyiospila* Malloch, 1926.

Key to the Species of Mydaea.

1 (2) *m* strongly upcurved in apical part (Fig. 107), R_5 one-half to two-thirds as wide at apex as at widest part (subgenus *Myiospila* Rond.). Eyes densely hairy. 2

strong *ia*; 4 *post dc*. Wings without suffusions. ♂ : Eyes separated by not more than distance of posterior ocelli. ♀ : Cruciate interfrontal setae present. Antennae, palpi and legs fuscous .. *meditabunda angustifrons* Mall., p. 472

2 (1) *m* straight or only slightly upcurved in apical part, R_5 at least four-fifths as wide at apex as at widest part. ♀ : Cruciate interfrontal setae absent.

3 (20) Hind tibia with 2 or more *ad* setae. Anterior *ia* well developed, not much shorter than posterior one. ♂ : Femora without an *av* comb of short strong pointed setae at apex (subgenus *Mydaea* R.-D., s. str.).

4 (7) Scutellum with black decumbent setulae along basal half of ventral edge. Auxiliary prostigmal strong. *pra* at least subequal to second *npl*. Arista short-plumose. Antennae inserted above middle of eyes (Fig. 108), the latter densely hairy. Fuscous with pale legs. 4 strong *post dc*. 1+2 *stpl*.

5 (6) Tarsi brown. Shoulders, all the mesonotum, pleurae and at least base of scutellum fuscous; epaulet brown. Arista, including plumosity, somewhat narrower than third antennal segment. Hind tibia with 3–4 *av* setae. ♂ : Lobes of fourth ventrite with a tuft of bristles near apex (Fig. 109).... .. .. *euspilariodes* sp. n., p. 475

6 (5) Tarsi pale testaceous. Shoulders, lateral part of mesonotum, much of pleurae and the whole of the scutellum as well as epaulet and basicosta pale ferruginous. Arista, including plumosity, somewhat wider than third antennal segment. Hind tibia with 1–2 *av* setae... .. .. *flavitarsata* sp. n., p. 477

7 (4) Scutellum bare on lower part of lateral surface and on ventral surface. *pra* weak or indistinct.

8 (11) Antennae inserted at level of upper third of eyes. Ventral margin of head straight from occiput to a point not far from vibrissa where it is suddenly bent up to the latter at an obtuse angle. Setulae at base of r_{4+5} extending at least half-way to *r-m*. Lower

stpl almost equidistant from anterior and posterior ones. Second antennal segment at apex of dorsal surface with small erect stubby setulae; third segment exceeding lower extremity of eye and almost reaching level of vibrissa. Almost wholly pale ferruginous. (*'Pendleburyia'* Mall.) ♂ : Eyes separated by about one-third headwidth.

9 (10) 3 *post dc.* Setulae on r_{4+5} almost or fully reaching *r-m*. .. *longicornis* Stein, p. 478

10 (9) 4 *post dc.* Setulae on r_{4+5} extending about half-way *to r-m*.. . .. *secunda* Mall., p. 480

11 (8) Antenna inserted near middle level of eye. Profile of head more or less evenly curved from occiput to vibrissa. Setulae confined to extreme base of r_{4+5}. Lower *stpl* closer to posterior than to anterior one. Second antennal segment with normal pointed setulose hairs.

12 (13) 3 *post dc.* Longest hairs of arista slightly shorter than width of third antennal segment. Body, femora, antennae and palpi fuscous. ♂ : Frons one-sixth headwidth.. .. .. *kambaitiana* sp. n., p. 481

13 (12) 4 *post dc.* Longest hairs of arista at least as long as width of third antennal segment, or femora pale ferruginous.

14 (17) Legs wholly or largely pale. Second antennal segment testaceous, the disc more or less browned.

15 (16) Scutellum and humeral callosity pale ferruginous. Legs wholly pale testaceous. Palpi and mentum testaceous. *pra* longer than second *npl*. ♂ : Eyes subcontiguous (♀ unknown). . .. .. *xanthopus* sp. n., p. 483

16 (15) Scutellum and humeral callosity fuscous with cinereous-grey dust. Tarsi piceous. Palpi and mentum fuscous. *pra* shorter than second *npl* (♂ unknown).. .. *piceitarsis* sp. n., p. 484

17 (14) Legs piceous or fuscous with testaceous tibiae. Second antennal segment fuscous. Scutellum fuscous with whitish-grey dust. *pra* shorter than second *npl* (♂ unknown).

18 (19) Apex of *m* virtually straight. 1+2 *stpl*. Auxiliary prostigmal distinct but much shorter than the main prostigmal. Scutellar suture longer than median line of scutellum. *malaiseana* sp. n., p. 485

19 (18) Apex of *m* markedly upcurved. 2+2 *stpl.* Auxiliary prostigmal almost as strong as main prostigmal, their apices almost at the same level. Scutellum as long on median line as wide between extremities of scutellar suture. — *longiscutellata* sp. n., p. 486

20 (3) Hind tibia with only 1 *ad* seta (at middle). Anterior *ia* considerably shorter than posterior one, sometimes indistinct. Setulae on under side of r_{4+5} extending about half-way to *r-m*. *m* at least very slightly upcurved at apex. Auxiliary prostigmal indistinct or weak. Shoulders, scutellum and base of abdomen pale testaceous translucent, legs pale ferruginous except sometimes the tarsi (subgenus *Eumyiospila* Mall.).

21 (22) 3 strong *post dc* and an indistinct or very small one between suture and the first, the first of the three strong ones not farther from suture than from second. Hind femur with short and irregular *av* setae, the distal 1–3 much stronger as pre-apicals. ♂: Femora without an *av* apical comb. — (f.?.) *pellucida* Stein., p. 488

22 (21) 4 strong *post dc*, the first of them nearer to suture than to second. ♂: At least posterior femora on apical part with a comb-like *av* row of short stout subequal setae (Figs. 49, 114). ♀: *av* setae of hind femur as in *pellucida*.. — *argentata* Walk., p. 490

Subgenus **Myiospila** Rondani.

Differs from *Mydaea* s. str. and subgenus *Eumyiospila* only by the strongly upcurved *m*, which is formed much as in *Stomoxys*, R_5 being narrowed at apex to one-half or one-third of its greatest width.

217. **Mydaea (Myiospila) meditabunda angustifrons** Malloch.

(Fig. 107)

1922. ! *Myiospila meditabunda* var. *angustifrons* Mall., *Ann. Mag. n. H.* (9), X, 132. Type: Gulmarg. B.M.

Black, thorax with the usual four dark undusted vittae which are defined by thin whitish (♂) or rather dense whitish-grey

to cinereous-grey (♀) dust; abdomen of male in dorsal view shining and thinly dusted grey, in posterior view moderately densely dusted steel-grey with a pair of rather large fuscous spots on intermediate segments, in female densely dusted grey with a pair of brown-dusted spots on intermediate segments. *Head* thinly dusted brownish-grey, parafacialia silver-white or (♀) more yellowish-white; eyes rather

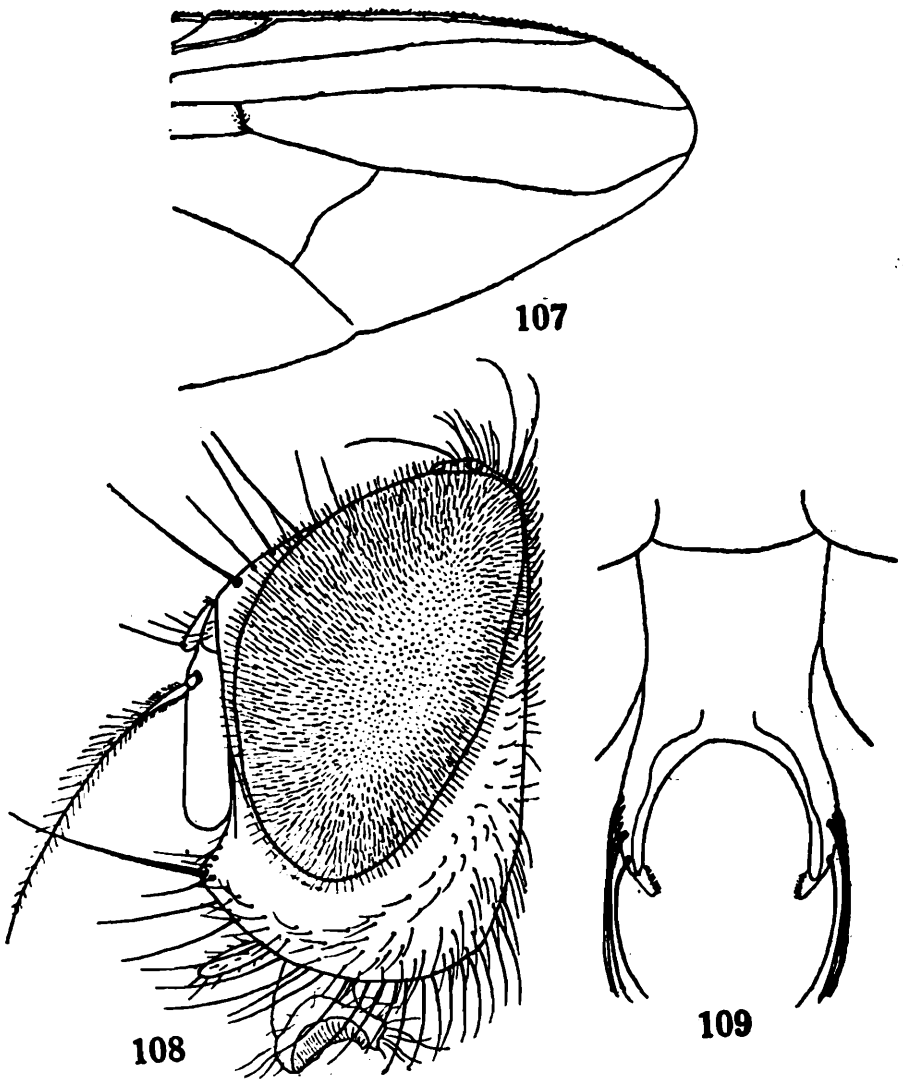


FIG. 107. *Mydaea* (*Myiospila*) *meditabunda angustifrons* Mall., apical part of wing.

FIG. 108. *Mydaea euspilariodes* sp. n., head of male type.

FIG. 109. *Mydaea euspilariodes* sp. n., fourth (fifth) ventrite.

densely haired, in male separated by not more than distance between posterior ocelli (in the Kambaiti males only two-thirds this distance), interfrontalia linear at and behind middle, forming an elongate triangle in front, parafrontalia linear but broadened at anterior end, with numerous inclinate setae, which practically extend to anterior ocellus, the last of

them being reclinate, ocellars moderately strong, verticals weak but distinct; frons of female more than a third (0·36–0·39)—but in the only Kambaiti female only three-tenths—head-width at vertex, moderately dilated with slightly convex sides to lunula, where it is two-fifths (0·40–0·42) head-width, frontal triangle somewhat dusted grey, reaching lunula, interfrontalia markedly narrowed to extremities, about four times as wide at middle as a parafrontale, the latter with 4–6 strong inclinate setae on anterior three-fifths and with conspicuous setulae on whole length of outer part, ocellars and verticals strong; parafacialia a third (♂) or almost two-thirds (♀), jowls almost twice, width of third antennal segment, the latter falling short of mouth-margin by half its own width, arista long-plumose, longest rays half as long again as width of third antennal segment. *Thorax* with small but distinct *prsc* and *pra*, 2+4 strong *post dc*, anterior *ia* only slightly anterior to level of second *post dc*, anterior mesopleural present, 2+2 *stpl*; hypopleura bare. *Abdomen* with distinct lateral marginals on anterior two segments, with lateral discals and a row of strong marginals on third, and with a row of strong marginals and discals on fourth. *Wings* subhyaline, in male with a brownish tinge and the base strongly infuscated to about level of node; veins dark brown, bare except for node at base of r_{4+5}, which is setulose above and below; r_1 reaching or slightly exceeding level of *r-m*, which lies at three-fifths (♂) or beyond middle (♀) of discal cell; r_{4+5} slightly curved back and sinuous, *m* strongly upcurved in almost apical half of last section and markedly sinuous at tip, much as in *Stomoxys* and *Morellia*, R_5 half, and in some females only a third, as wide at apex as at widest part; *m-m* somewhat oblique and sinuous. Lower calyptra of male pale brownish-grey subopaque with concolorous border and gold-brown fringe, in female opaque whitish with brownish border and whitish fringe. Halteres reddish-yellow. *Legs* wholly fuscous-black not very long; fore tibia without a *p* seta; mid femur with the *a* pre-apical very small, *av* surface with a row of weak setae on basal third or half and *pv* surface with strong setae on basal half or more, mid tibia with 2–3 *p* setae; hind femur with 3–4 weak *pv* setae (indistinct in the Kambaiti males) and a complete *av* row, in which the distal setae are stronger, hind tibia with 1–2 *av* and 3–6 not very strong *ad* setae.

Length.—4·9–8 mm., of wings 4·6–7·3 mm.

Distribution.—KASHMIR: Gulmarg, 8,500 ft.; Dal Lake, Nagin, V.46. N. INDIA: W. Himalaya, Rhotang Pass, on snow. N.E. BURMA: Kambaiti.

The head of the type (♂) and the abdomen of the paratype (♀) are missing. The subspecies differs from the European form only in the male sex, which appears darker, the thorax being more indistinctly vittate, the abdomen with much darker pruinescence and fainter and larger spots; the frons is narrower and the wings fuscous to beyond *sc* whereas they are at most slightly yellowish at base in American and European specimens. Slightly teneral European specimens have the frons as narrow or narrower, as indicated in Malloch's description, but this does not apparently occur in normal specimens. Malloch's male has the appearance of a large dark specimen, such as may be expected to occur in mountains. The female is said to differ from typical ones by much more conspicuous abdominal spots. However, these are very small and faint in the Dal Lake female. The Kambaiti males have the frons even narrower than *angustifrons* (and *brunettiana* Enderl.), the eyes conspicuously haired like *meditabunda* and *angustifrons*, and the pollinosity of thorax and abdomen as in *angustifrons*. Central American specimens are very similar to the Burma series. Considerable geographical variation thus appears to occur in this species, but the material at hand is insufficient for defining the various races and their areas. The Chinese ssp. *brunettiana* Enderl., differs from the type form by sparser (but very distinct) hairs of the eyes and more spinulose parameres (as far as can be judged from a single specimen* dissected).

Subgenus **Mydaea** (s. str.)

Among the groups belonging to *Mydaea* s.l., *Mydaea* in the restricted sense is recognized by the straight or almost straight apical section of *m* and, in the male, the absence of an *av* 'comb' from the apical part of the femora. All the Oriental species known to me have two or more *ad* setae on the hind tibia and a well-developed anterior *ia*.

218. **Mydaea** (s. str.) **euspilariodes** sp. n.

(Figs. 108, 109)

♂ ♀ : Fuscous-black with pale ferruginous femora and tibiae; coxae and trochanters often more or less pale, scutellum

* This, the genitalia of which were figured by Enderlein, 1927, *Konowia*, VI, p. 51, is in the B.M. and is herewith selected as the type of *brunettiana*. I am much obliged to Prof. F. Peus for returning the dissected genitalia to the B.M.

often testaceous at apex or on greater apical part. *Head* (Fig. 108) fuscous-black with rather dense fine pale grey dust, parafacialia and parafrontalia silver-dusted; eyes densely haired, in male hairs long, eyes subcontiguous, separated by less than width of ocellar tubercle, interfrontalia linear above middle, visible as a very small narrow triangle above and as a moderately large one below, parafrontalia linear in upper half, moderately broadened to lunula, with about 7 inclinate setae on anterior half or so, and with or without 2–3 fine setulae from there to level of anterior ocellus, ocellars not very strong, verticals thin but quite long and distinct; frons of female three-tenths (0·30–0·32) head-width at vertex, evenly dilated with hardly convex sides to lunula where it is almost two-fifths (0·36–0·39) head-width, frontal triangle thinly dusted grey, somewhat shining, fading out at lunula, interfrontalia somewhat narrowed at extremities, four times as wide at middle as a parafrontale, the latter with 4–6 rather strong inclinate setae on more than anterior half and proclinate black setulae (anteriorly in 2–3 rows) on outer part, ocellars and verticals strong; parafacialia half, jowls half again, as wide as third antennal segment, the latter almost reaching mouth-margin; arista densely short-plumose, rays very gradually becoming shorter from basal quarter onwards, longest rays slightly more than half as long as width of third antennal segment. *Thorax* rather thinly dusted whitish-grey, the four (six) undusted vittae as broad as the pale dusted ones between them, somewhat suffused; *prsc* rather strong, both *ia* strong, *pra* as a rule markedly longer than second *npl*. *Abdomen* thinly dusted grey, rather glossy, with purplish reflections, in male with a narrow well-defined undusted median vitta, in female with a broader, less sharply defined median vitta and poorly defined broad shifting hind margins; anterior segments with lateral marginals, third with lateral discals and a marginal row, which becomes weak in female towards median line, fourth with a row of strong discals and rather weak marginals; lobes of fourth ventrites of male separated by a large broad semicircular excision. *Wings* greyish subhyaline with a brownish tinge, veins brown with testaceous bases; r_1 reaching or slightly exceeding level of *r-m*, which lies beyond middle of discal cell, r_{4+5} shallowly sinuous, *m* very slightly curved backward in apical section but with a straight tip; *m-m* moderately oblique and slightly sinuous or concave. Lower calyptra yellowish-grey sub-opaque with pale ochraceous border and fringe. Halteres pale reddish-yellow. *Legs:* Mid femur on basal half with some fine (in male rather distinct) *av* and strong *pv* setae, mid tibia

with (2–)3 *p* setae; hind femur without *pv* but with a complete row of *av* setae, which are somewhat (♂) or much (♀) weaker on basal half, hind tibia with 2–3 *ad* and 3–4 *av* setae.

Length.—5·5–6·8 mm., of wings 5·7–7·2 mm.

Distribution.—N.E. BURMA: Kambaiti, 2,000 m., 28.IV.34 (*R. Malaise*), ♂ type (in Mus. Stockholm), 25.IV–4.VI.34, 2 ♀ 13 ♂ paratypes (in Mus. Stockholm, Helsinki and B.M.).

The hairy eyes, setulose lower edge of the scutellum and four *post dc* are characters reminiscent of *Helina* (*Euspilaria*) *lucorum* (Fln.), but there is, of course, no close relationship between the two species. Even superficially there is not much similarity in other characters, that species having dark legs, suffused transverse veins and paired abdominal spots.

219. **Mydaea** (s. str.) **flavitarsata** sp. n.

♀ : Head and abdomen fuscous-black, thorax pale ferruginous with the disc of the mesonotum (up to the *prst* and *ia* laterally) fuscous or piceous, pleurae with large infuscated spots; basal part of antenna and in some specimens base of abdomen somewhat testaceous translucent, basal two-fifths of arista and the whole of the legs pale testaceous to pale ferruginous. Proboscis testaceous; palpi testaceous with browned apex. *Head* rather densely dusted pale yellowish-grey, parafacialia and parafrontalia somewhat more silvery; eyes rather densely short-haired, frons almost three-tenths (0·28–0·30) head-width at vertex, evenly dilated with very slightly convex sides to lunula, where it is about a third (0·33–0·36) head-width, frontal triangle poorly defined, somewhat dusted brown and slightly shining, fading out near lunula, interfrontalia somewhat narrowed at extremities, 4½–5 times as wide at middle as a parafrontale, the latter with 3–5 rather strong inclinate setae and, on outer part, an irregular row of proclinate setulae, ocellars and verticals strong; parafacialia about a third, jowls equalling, width of third antennal segment, the latter not quite reaching mouth-margin; arista not very densely plumose, the rays very slowly decreasing in length from basal fourth onwards, longest rays three-quarters as long as width of third antennal segment. *Thorax* with rather dense whitish-grey dust, a broad median vitta and a moderately broad vitta along the *dc*, both vittae becoming narrower behind suture, the undusted dark paramedian vittae correspondingly narrow in front of suture and broad behind suture, outer dark vittae forming a triangular spot in front of suture and a broad streak between the *dc* and *ia* behind suture; *prsc* rather strong,

both *ia* strong, *pra* subequal to second *npl.* *Abdomen* thinly dusted brown, glossy, fourth segment more densely dusted grey, somewhat contrasting with the preceding ones; setae as in *euspilariodes.* *Wings* greyish subhyaline with a conspicuous ochraceous tinge, which becomes stronger near fore margin and base; veins testaceous to light brown with ochraceous bases; r_1 slightly exceeding level of *r-m*, which lies near middle of discal cell, r_{4+5} very shallowly sinuous, *m* almost unnoticeably upcurved at tip; *m-m* slightly oblique and sinuous or concave. Calyptrae greyish-ochraceous, somewhat subopaque with pale ochraceous border and golden fringe. Halteres pale reddish-yellow. *Legs:* Mid femur with 4–5 small erect *av* and 3 rather strong *pv* setae in basal third, mid tibia with 3 strong *p* setae; hind femur without *pv* setae but with a complete *av* row which consists of very small setae in basal half and of four strong setae in apical half, hind tibia with two rather strong *ad* and 1(–2) *av* setae.

Length.—6·7–7·5 mm., of wings 6·7–7·6 mm.

Distribution.—N.E. BURMA: Kambaiti, 2,000 m., 4.VI.34 (*R. Malaise*); ♀ type (in Mus. Stockholm), 30.IV.–4.VI.34; 4 ♀ paratypes (in Mus. Stockholm, Helsinki and B.M.).

220. **Mydaea** (s. str.) **longicornis** Stein.

(Fig. 110)

1915. *Mydaea longicornis* Stein, *Suppl. ent.*, IV, 15; ♀; 1918, *Ann. Mus. nat. Hungar.*, XVIII, 153, 183. Type Chip-Chip. Deutsches Ent. Inst.

1928. *Pendleburyia longicornis* (Stein), Mall., *Ann. Mag. n. H.* (10), II, 312 (♂ ♀); 1935, *ibid.* (10), XVI, 222.

Pale ferruginous, upper part of occiput and hind margin of first to third abdominal segments fuscous, frons brown to fuscous-brown, suffusedly rufous on anterior margin, mesonotum with two pairs of undusted brown vittae, third and fourth abdominal segments and greater posterior part of second browned, base of third narrowly, and apex of fourth somewhat, paler translucent; third antennal segment and tarsi slightly browned. *Head* (Fig. 110) with thin pale greyish-yellow dust, profile of face straight on upper four-fifths and of frons on anterior two-thirds; eyes almost bare, their lower extremity not reaching level of vibrissae; frons at vertex more than a third (0·34–0·35) head-width, very slightly broadened with almost straight sides to lunula where it is hardly wider (0·35–0·37 times head-width); frontal triangle poorly defined, somewhat shining behind, dusted brownish and

narrowly drawn out in front, almost reaching lunula, interfrontalia slightly narrowed at extremities, four times as wide at middle as a parafrontale, the latter with 4–5 inclinate setae on anterior three-fifths and a few small proclinate hairs on outer part; ocellars moderately strong, verticals strong; parafacialia almost linear, jowls as wide as third antennal segment, the latter reaching mouth-margin; arista long-plumose, the rays very slowly becoming shorter from basal quarter onwards, longest rays more than half as long again as width of

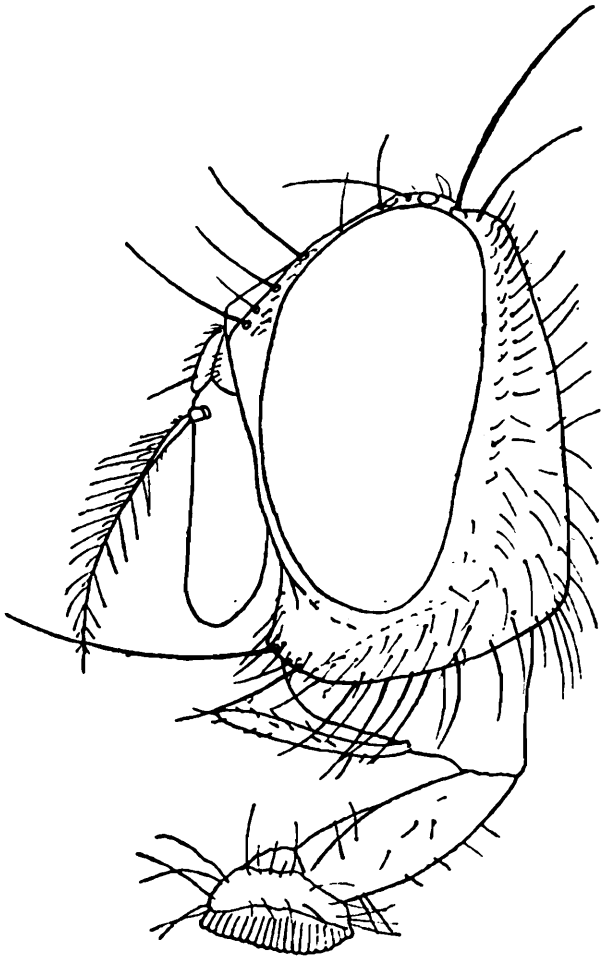


FIG. 110. *Mydaea longicornis* Stein, head of female.

third antennal segment. *Thorax* with rather thin whitish dust on disc, somewhat more densely dusted in front of suture, the undusted brown vittae rather narrow, in posterior view a faint undusted (but not browned) median vitta becomes visible, which fades out towards neck; *prsc* rather weak, both *ia* rather strong, *pra* rather strong though somewhat smaller than second *npl*; auxiliary prostigmal hair-like. *Abdomen* thinly dusted brownish, glossy, with only lateral marginals and discals, the latter rather strong on

third and fourth segments, this segment also with a row of moderately strong marginals. *Wings* subhyaline with a slight ochraceous-grey tinge, veins brown, *r-m* and *m-m* suffused; r_1 reaching level of *r-m*, which lies beyond middle of discal cell, apex of r_{4+5} almost straight, that of *m* almost unnoticeably upcurved; *m-m* rather upright and almost straight. Calyptrae brownish-grey with dull brown border, the lower one subopaque, fringe golden-brown. Halteres dull brownish-yellow. *Legs:* Mid femur without *av* or *pv* setae, but the decumbent hair of the *av* and *pv* rows somewhat longer towards apex, mid tibia with 2 *p* setae (and 1–3 stronger setulae); hind femur without distinct setae except for a strong *av* at three-fifths and another at apical quarter, hind tibia with 2 *ad* and 2–4 *av* setae.

Length.—5·2–7 mm., of wings 5·8–? mm.

Distribution.—MALAYA (Malloch, 1928). N.E. BURMA: Kambaiti, 2,000 m. (*R. Malaise*). FORMOSA: Chip-Chip.

In one of the two females at hand both fore tibiae have a very small *p* seta. See also the remarks under *M. secunda*.

221. **Mydaea** (s. str.) **secunda** (Malloch).

1935. ! *Pendleburyia secunda* Mall., *Ann. Mag. n. H.* (10), **XVI**, 222 ♂. Type: Bukit Kutu. B.M.

Exactly identical with *longicornis* except for the 4 *post dc* and the less extensively setulose base of r_{4+5}. Malloch's type has the dorsal surface of the abdomen piceous, with a narrow basal band on the second segment and the first, apart from a piceous hind margin, wholly pale ferruginous, the thorax with conspicuous suffused vittae, and the apical two-fifths of the interfrontalia ochraceous, but a specimen from Kambaiti does not differ in these characters from *longicornis*. *m-m* is slightly suffused in the type, and the apical fourth is evenly but slightly clouded, whilst in the Kambaiti male *m-m* is not noticeably suffused but the apical margin very conspicuously so. In this specimen the dark colouration of the abdomen is especially conspicuous on each side of a faint narrow pale median vitta and along the hind margins, the tarsi are piceous in this specimen, the only male I have seen.

Distribution.—MALAYA: Bukit Kutu, 3,500 ft., Selangor (type, in B.M.). N.E. BURMA: Kambaiti, 2,000 m. (*R. Malaise*).

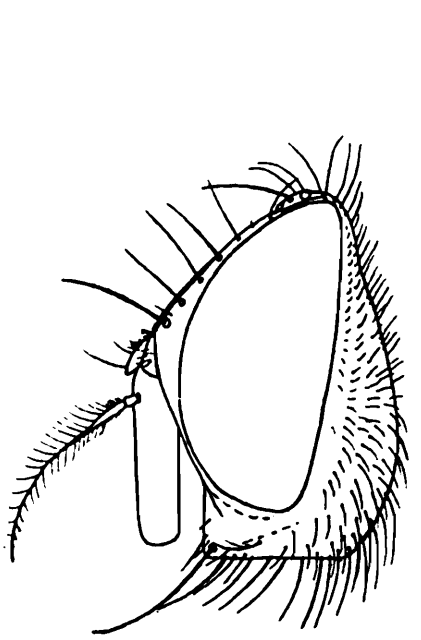
Malloch states that the series of *longicornis* from Malaya shows much variation in colour of wing, 'some having the apices dark and others the wing hyaline', he also thinks that

the setulae on r_{4+5} may be subject to individual variation 'as in numerous other species' The same will certainly apply to the small differences in colouration, so that the only distinction would lie in the *post dc*. As the second of these is markedly smaller in both specimens of *M. secunda*, and as the first two *post dc* of *longicornis* are to a varying degree more widely separated than the second from the third, I am practically convinced that these setae also vary, and that *secunda* is a synonym of *longicornis*.

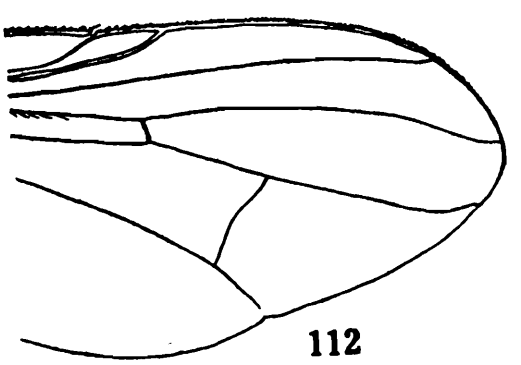
222. **Mydaea** (s. str.) **kambaitiana** sp. n.

(Fig. 111)

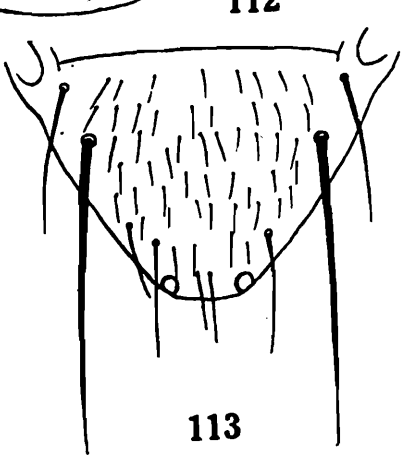
♂: Fuscous-black with piceous-brown legs but pale testaceous tibiae; mesonotum dusted whitish with four undusted vittae. *Head* (Fig. 111) with moderately dense



111



112



113

FIG. 111. *Mydaea kambaitiana* sp. n., head of male type.
FIG. 112. *Mydaea longiscutellata* sp. n., apical part of wing.
FIG. 113. *Mydaea longiscutellata* sp. n., dorsal view of scutellum.

whitish dust in front and pale grey dust on occiput, interfrontalia dull black; eyes almost bare, separated by a sixth head-width, frons narrowest just above middle, slightly dilated to

vertex and somewhat more to lunula, interfrontalia moderately broad throughout, as slightly dilated to lunula as to vertex, thrice as wide above middle as a parafrontale, the latter with 5–7 moderately strong inclinate setae and, only slightly more widely separated, a reclinate seta not much anterior to level of anterior ocellus, ocellars moderately strong, verticals weak; parafacialia less than one-third, jowls one-and-a-half times, width of third antennal segment, the latter reaching mouth-margin; arista plumose, fully as wide, including plumosity, as third antennal segment and retaining this width from basal to apical fifth, longest rays not quite as long as width of that segment. *Thorax* moderately densely dusted whitish, the dust having a mauve or, on posterior part of disc, greyish-brown tinge, undusted paramedian vittae narrow and sharply defined, slightly broader behind suture and reaching second *post dc* (but approaching base of scutellum in an extreme posterior view), outer vittae broader, behind suture they consist of a vitta between the dusted *dc* and *ia* vittae and a broadly dark declivitous part, dorsal surface of scutellum in posterior view dusted grey on either side of basal half; *prsc* weak, *ia* rather strong, *pra* small, anterior mesopleural and auxiliary prostigmal weak, 1+2 *stpl*; hypopleura bare. *Abdomen* oblong-ovate, rather thinly dusted pale grey and shining, with conspicuous brassy reflections on disc, lateral marginals rather strong on anterior segments, lateral discals on third, the latter and the fourth with a complete row of rather strong marginals, fourth also with a row of widely spaced discals. *Wings* whitish-grey subhyaline with dark brown veins, *C* unusually broad, r_1 slightly exceeding level of *r-m*, which lies well beyond middle of discal cell, r_{4+5} and *m* straight at apex, slightly diverging, the former with setulae on only basal node; *m-m* rather upright and straight. Calyptrae yellowish-grey, lower one subopaque with pale ochraceous border and pale golden fringe. Halteres dull reddish (perhaps greasy and in reality paler). *Legs* with rather short claws and pulvilli; mid femur with some half-erect *av* hairs near base and 3 not very strong *pv* setae in basal third, mid tibia with 2–3 *p* setae; hind femur without *pv* setae, without distinct *av* in basal two-thirds, but with 3–4 setae in apical third, one of which near apex is strong, the others being very weak, hind tibia with 2 *ad* and 2 *av* setae.

Length.—Of both body and wing 4·5 mm.

Distribution.—N.E. BURMA: Kambaiti, 7,000 ft., 23.V.34 (*R. Malaise*), ♂ type (in Mus. Stockholm).

223. **Mydaea** (s. str.) **xanthopus** sp. n.

♂: Piceous with pale ferruginous shoulders, postalar callosity, scutellum and legs including tarsi and coxae; pleurae suffusedly ferruginous along sutures, etc., palpi testaceous, antennae pale testaceous in ground-colour, second segment slightly browned, third from insertion of arista to tip strongly browned. *Head* dusted pale grey on occiput, greyish-white on lower anterior part and silver-white on parafacialia and parafrontalia; eyes almost bare, with markedly enlarged anterior facets, subcontiguous, separated by hardly $\frac{1}{15}$ head-width, interfrontalia rufous-brown, linear at and above middle and forming a rather narrow triangle below, parafrontalia sublinear, slightly wider anteriorly, on anterior two-fifths with 2–3 moderately strong inclinate setae and 1–3 intercalated setulae, ocellars moderately strong, verticals apparently very weak; parafacialia almost half, jowls fully, as wide as third antennal segment, the latter not quite reaching mouth-margin; arista plumose, fully as wide, including plumosity, as third antennal segment, of almost even width from basal to apical fourth, longest rays four-fifths as long as width of third antennal segment. *Thorax* thinly greyish-dusted, apparently without conspicuous undusted vittae; *prsc* thin but long, second *post dc* much weaker than first and third, *ia* and *pra* rather strong, longer than second *npl*; anterior mesopleural small, auxiliary prostigmal long, 1+2 strong *stpl*, hypopleura bare. *Abdomen* short-ovate, glossy, thinly and evenly dusted pale grey, anterior segments with strong lateral marginals, third with a widely spaced row of strong marginals, fourth with a similar row of strong discals and a complete row of marginals, which are strong at sides but rather weak near median line; hypopygium rather large but not very protruding, lobes of fourth ventrite dull ferruginous, with a row of about 6 closely placed long setae. *Wings* yellowish-grey subhyaline, somewhat ochraceous at base, veins pale testaceous, r_1 slightly exceeding level of *r-m*, which lies beyond middle of discal cell, r_{4+5} shallowly sinuous at apex, *m* practically straight; *m-m* slightly oblique and sinuous. Calyptrae apparently ochraceous (greasy) with pale golden fringe. Halteres dull reddish (greasy). *Legs:* Mid femur with somewhat longer half-erect *av* setulae, especially near base, and with 3–4 *pv* setae in basal two-fifths, mid tibia with 3 strong *p* setae; hind femur with 6–7 setulose hairs on basal half of *pv* surface, some of which are strong enough to be called weak setae, and with weak setulose hairs on basal half and 4–5 irregular setae (*i.e.* stronger and

weaker setae irregularly alternating) on apical half of *av* surface, hind tibia with 2 rather strong *ad* and 3–4 rather weak *av* setae.

Length.—Of both body and wings 6·1 mm.

Distribution.—N.E. BURMA: Kambaiti, 2,000 m., 24.V.34 (*R. Malaise*), ♂ type (in Mus. Stockholm).

The specimen is rather greasy and the abdomen somewhat squashed. Somewhat similar to the European *M. tincta* (Zett.) and *setifemur* Ringd., but in the males of both of these the antennae and palpi are wholly fuscous, the shoulders and scutellum darkened at least in part, and the hypopygium smaller.

224. **Mydaea** (s. str.) **piceitarsis** sp. n.

♂ ♀: Wholly fuscous-black with pale ferruginous legs but piceous tarsi; basal two antennal segments testaceous but largely browned. *Head* with occiput dusted pale grey and face dusted silver-grey, parafrontalia in anterior view black and strongly contrasting with parafacialia, in dorsal view dusted pale grey; eyes thinly short-haired, frons at vertex three-tenths head-width, evenly moderately dilated with hardly convex sides to lunula, where it is well over a third (0·35–0·37) head-width, frontal triangle broad and short, but apex suddenly drawn out into a narrow tongue which exceeds middle and may approach lunula, interfrontalia conspicuously narrowed at extremities, four times as wide at middle as a parafrontale, the latter with 5–6 rather unequal inclinate setae on anterior three-fifths and with numerous black setulae on outer part, ocellars and verticals strong; parafacialia almost one-half, jowls one-and-a-quarter, width of third antennal segment, the latter falling short of mouth-margin by a third of its own width; arista rather long-plumose, more than half as wide again at second fifth as third antennal segment, the rays quickly becoming shorter from there to apex, longest rays three-quarters as long as width of third antennal segment. *Thorax* rather densely dusted pale grey with four (6) conspicuous undusted vittae, the paramedian ones moderately narrow, in dorsal view exceeding second *post dc*, the outer ones conspicuously interrupted; *prsc* moderately strong, *ia* strong, *pra* short but quite strong, shorter than second *npl*, which itself is rather short, anterior mesopleural distinct, auxiliary prostigmal rather strong, 1+2 *stpl*, hypopleura bare. *Abdomen* short-ovate to subcordate, not very densely dusted grey, the dust with shifting spots and on the intermediate segments more brown, these with brassy reflections; anterior

segments with not very strong lateral marginals, third with a marginal row of rather long setae, which are, however, rather thin towards middle, fourth with a discal and marginal row of not very strong setae. *Wings* subhyaline with a brownish-grey tinge, base ochraceous, veins brown or light brown; r_1 slightly exceeding level of *r-m*, which lies well beyond middle of discal cell; r_{4+5} shallowly sinuous, *m* slightly curved backward in apical part, the two veins thus a little diverging at tip; *m-m* slightly oblique and sinuous. Calyptrae pale greyish-ochraceous with pale yellowish border and pale golden fringe. Halteres pale reddish-yellow. *Legs:* Mid femur with the *av* and *v* hairs somewhat erect basally and with 4–5 strong *pv* setae on more than basal third, mid tibia with 3 *p* setae; hind femur without *pv* setae, the *av* surface with very small and almost indistinct setae in basal half and with 4–6 strong setae in apical half, hind tibia with 2–3 *ad* and 2–3 weak *av* setae.

Length.—7·3–7·5 mm., of wings 6·8–7·3 mm.

Distribution.—N.E. BURMA: Kambaiti, 1,800 m., 7.VI.34 (*R. Malaise*), ♀ type (in Mus. Stockholm), 2,000 m., 24.V.34, 1 ♀ paratype (in B.M.).

Reminiscent of the European species *detrita* (Zett.), *urbana* (Meig.) and *discimana* Mall. The former two differ by the long *pra*, the latter by the broadened apical segment of the fore tarsi. The second antennal segment is darker and the *av* setae on basal half of hind femur are stronger in these European species.

225. **Mydaea** (s. str.) **malaiseana** sp. n.

♀ : Wholly fuscous-black with testaceous tibiae, femora piceous-brown or fuscous; mesonotum moderately thickly dusted whitish with four (six) conspicuous undusted vittae. *Head* dusted brownish-grey, upper part of parafacialia dusted silver-white with a spot of dark reflections at apical level of second antennal segment; eyes almost bare, frons at vertex almost a third (0·30–0·33) head-width, evenly dilated with hardly noticeably convex sides to lunula, where it is about two-fifths (0·39–0·41) head-width; frontal triangle dusted near ocelli, rather shiny in front, exceeding middle of frons, interfrontalia conspicuously narrowed at extremities, four times as wide at middle as a parafrontale, the latter with 4–6 inclinate setae on more than anterior half and with some black setulae on outer part, ocellars and verticals strong; parafacialia more than a third as wide, jowls a third as wide again, as third antennal segment, the latter almost or quite

reaching level of mouth-margin; arista rather long-plumose, fully half as wide again, including plumosity, as third antennal segment, rays slowly becoming shorter from second fifth onwards, longest rays as long as width of third antennal segment. *Thorax* in dorsal view appearing almost undusted laterad of a line a little outward to the *dc*; *prsc* small, *ia* rather strong, *pra* small; anterior mesopleural distinct, auxiliary prostigmal weak, sometimes indistinct, hypopleura with some fine hairs above hind coxa. *Abdomen* thinly dusted grey, rather glossy and with slight bronze or leaden reflections, anterior segments with weak lateral discals and marginals, third with lateral discals and a row of strong marginals, fourth with a row of strong discals and rather weak marginals. *Wings* subhyaline with a very slight brownish tinge, veins pale testaceous; r_1 reaching level of *r-m*, which lies beyond middle and sometimes at three-fifths of discal cell, r_{4+5} shallowly sinuous, *m* virtually straight, at apex, *m-m* slightly oblique and outwardly concave. Calyptrae yellowish-white with pale yellow border and whitish fringe, lower calyptra subopaque. *Legs:* Mid femur with 5–6 short *av* setae and 3–4 much stronger *pv* setae in basal third, mid tibia with (2–)3 rather strong *p* setae; hind femur with 1–2 outstanding setulose hairs near base of *pv* surface, and with small setae in basal and four strong ones in apical half of *av* surface, hind tibia with 2(–3) *ad* and 1–2 *av* setae.

Length.—4·4–5·7 mm., of wings 4·5–5·4 mm.

Distribution.—N.E. BURMA: Kambaiti, 2,000 m., 5.V.34 (*R. Malaise*), ♀ type (in Mus. Stockholm), 26.IV–11.V.34, 5 ♀ paratypes (in Mus. Stockholm, Helsinki and B.M.).

The characters are similar to those of the European *M. ancilla* (Meig.), but that species is much larger, the hairs of the arista are much shorter, and the abdomen has conspicuous shifting spots.

226. **Mydaea** (s. str.) **longiscutellata** sp. n.

(Figs. 112, 113)

♀: Wholly fuscous-black with piceous-brown femora and tarsi and testaceous tibiae; mesonotum rather thinly dusted whitish with four narrow vittae. *Head* rather densely dusted whitish-grey in front and pale grey on occiput, parafacialia more silver-white on upper part with a small inconspicuous shifting dark spot at level of second antennal segment; eyes almost bare, frons at vertex slightly over a quarter head-width, moderately and evenly broadened with

straight sides to lunula, where it is almost a third head-width, frontal triangle thinly dusted grey, slightly shining, apex narrowly drawn out and almost reaching lunula, interfrontalia conspicuously narrowed in front and somewhat narrowed above middle, four times as wide at middle as a parafrontale, the latter on anterior half or a little more with 3–4 strong inclinate setae, between and above them 2–3 small ones and, on outer part, an irregular row of rather conspicuous proclinate black setulae; parafacialia less than a third, jowls approximately as wide as third antennal segment, the latter almost reaching mouth-margin; arista not much longer than antenna, with rather dense long rays, which become slowly shorter from second fifth onwards, longest rays half as long again as width of third antennal segment. *Thorax* rather thinly dusted whitish-grey, paramedian vittae just exceeding second *post dc*, *prsc* fine, *ia* rather strong, *pra* short but very distinct; anterior mesopleural distinct, auxiliary prostigmal long, lower anterior *stpl* present but rather weak; hypopleura with a few very small hairs above hind coxa. *Abdomen* evenly and moderately thickly dusted grey, with a faint pair of rather large roundish spots of brownish dust on second and an indication of similar spots on third segment, anterior segments with distinct short lateral marginals and indistinct lateral discals, third with distinct lateral discals and a row of strong marginals, fourth with a row of strong discals and moderately strong marginals. *Wings* subhyaline with a slight brownish tinge, veins testaceous, r_1 distinctly exceeding level of *r-m*, which lies well beyond middle of discal cell, R_5 slightly narrowed at apex, r_{4+5} somewhat curved back but near apex virtually straight, *m* very distinctly upcurved at tip (Fig. 112); *m-m* hardly oblique, slightly concave outwardly. Calyptrae pale yellowish-grey, lower one subopaque, border yellowish with whitish fringe. Halteres reddish-yellow. *Legs:* Mid femur with about 6 rather conspicuous small *av* setae in basal third and 4–5 moderately strong *pv* setae in basal half, mid tibia with 2 strong and 1 small *p* seta; hind femur without *pv* setae, *av* surface with about 5 small setae on basal three-fifths and 3–4 strong ones near apex, hind tibia with 2 *ad* and 1 *av* seta, which are rather strong.

Length.—5·7 mm., of wings 5·4 mm.

Distribution.—INDIA: Mawphlang, Khasia Hills, 10.X.20, on scrub (*R. Senior White*), ♀ type (in B.M.).

Subgenus **Eumyiospila** Malloch.

The distinctive character is the absence or smallness of the anterior *ia* and the more or less distinctly upcurved *m*. However, the main reason which induced Malloch to create this genus was probably the presence of an *av* comb of stout short setae on the femora of the male in the species known to him. This comb is found in only one of the two Indian forms and, moreover, it proves to be a variable character. Both species have a pair of conspicuous strong setae near hind margins of ventrites 1–3.

227. **Mydaea (Eumyiospila) pellucida** (Stein).

1900. *Spilogaster pellucida* Stein, *Ann. Mus. Genova*, **XX**, 381. Type: New Guinea. Mus. Genova.
1918. *Mydaea attenta* Stein, *Ann. Mus. nat. Hungar.*, **XVI**, 167, 183 ♂. Type: Calcutta. Indian Mus., Calcutta ? n. syn.
1928. *Eumyiospila pellucida* (Stein), Mall., *Ent. Mitt.*, **XVII**, 314.
1935. *Eumydaea attenta* (Stein), Karl, *Arb. morph. taxon. Ent.*, **II**, 41.
1952. *Mydaea* (*Eumyiospila*) *pellucida* (Walk.), (errore), Hennig, *Beitr. Ent.*, **II**, 76.

Fuscous with pale ferruginous shoulders, scutellum (except dorsal surface), legs and base of abdomen; antennae pale reddish-yellow with slightly browned basal segments and, in female, apical part of third. *Head* moderately densely dusted whitish-grey, face and parafrontalia with silver-white reflections; eyes bare, in male contiguous but with narrow band-shaped parafrontalia which separate them by about $\frac{1}{5}$ head-width, interfrontalia visible as a minute elongate triangle at lunula and anterior ocellus, otherwise obsolete, parafrontalia with 2 strong and, alternating with them, 2–3 small inclinate setae on anterior two-fifths and with a small but distinct proclinate setula just anterior to front ocellus, ocellars moderately strong, verticals small but rather distinct; frons of female about a quarter (0·24–0·27) head-width at vertex, evenly rather strongly dilated with straight sides to lunula where it is more than a third (0·34–0·36) head-width, frontal triangle thinly dusted grey, hardly shining, reaching lunula, interfrontalia slightly narrowed at lunula and towards vertex, two-and-a-half times as wide at middle as a parafrontale, the latter with 1 strong and 2–3 weak inclinate setae on anterior half, and with a few proclinate setulae on outer part, ocellars and verticals strong; parafacialia one-third to

one-half, jowls approximately, width of third antennal segment, the latter falling short of mouth-margin by about half its own width; arista long-plumose, the rays becoming shorter from second fifth onwards, longest rays almost (♀) or fully (♂) twice as long as width of third antennal segment. *Thorax* rather densely dusted whitish-grey, vittae indistinct in male except for linear paramedian vittae in front of suture, distinct but narrow in female; *prsc* small but distinct, *pra* very small; anterior mesopleural conspicuous, hypopleura bare. *Abdomen* more or less broadly pale translucent, pale at base, especially in male, the pale colouration in female sometimes visible only near base of ventral surface, sometimes hardly noticeable, second to fourth segments on disc with a pair of suffusedly brown-dusted spots, which are largest on third and smallest or indistinct on fourth, setae of female as in *longiscutellata*, in male second segment with strong lateral marginals and distant lateral discals, third with rather strong lateral discals and a row of strong marginals, fourth with a row of strong marginals and discals. *Wings* greyish subhyaline with a slight brownish tinge, veins testaceous; r_1 markedly exceeding level of *r-m* which lies beyond middle of *m-m*, r_{4+5} shallowly sinuous at apex, setulae extending almost, or more than, half-way to *r-m*, *m* very slightly upcurved at apex. Calyptrae pale ochraceous-grey, lower one subopaque, with pale ochraceous border and pale golden fringe. Halteres pale reddish-yellow. *Legs :* Mid femur with 5–7 small *av* and 3–4 strong *pv* setae in basal two-fifths, mid tibia with 2 strong *p* setae; hind femur with 2 *pv* setae in basal two-fifths, *av* setae weak or indistinct except for (1–)2 in basal and 2–3 in apical two-fifths, which are more or less strong; hind tibia with 1 *ad* and 1–3, usually 1, *av* setae.

Length.—5·4–6·0 mm., of wings 5·4–5·8 mm.

Distribution.—CEYLON. INDIA (Calcutta). MALAYA (Pahang; Selangor; Pulau Jarak, W. Coast). FORMOSA. SUMATRA. JAVA. LOMBOK. NEW GUINEA.

Biology.—Jacobson has apparently bred a specimen from a larva found in an inflorescence of Scitamineae (*see* Malloch 1928).

Stein's description of *attenta* fits the present species so perfectly that there can be no doubt as to the synonymy, and Karl identified the species in the same way, but Stein's key (p. 183) is very misleading as it says 'Hinterleib nie durchscheinend gelb' in contradiction to his description according to which 'die beiden ersten Ringe' are 'an den Seiten ockergelblich durchscheinend'.

228. **Mydaea (Eumyiospila) argentata** (Walker).

(Figs. 49, 114)

1857. ! *Aricia argentata* Walk., *Proc. Linn. Soc. Lond.*, I, 27. Type: Malacca. B.M.

1860. ! *Aricia integra* Walk., *Proc. Linn. Soc. Lond.*, IV, 140; Stein, 1901, *Zeit. Hymen. Dipt.*, I, 199. Type: Makassar. B.M.

1860. ! *Aricia nigricosta* Walk., *Proc. Linn. Soc. Lond.*, IV, 140; Stein, 1901, *Zeit. Hymen. Dipt.*, I, 203. Types: Makassar; Celebes. B.M.

1901. *Spilogaster argentata* (Walk.), Stein, *Zeit. Hymen. Dipt.*, I, 187.

1915. *Mydaea argentata* (Walk.), Stein, *Suppl. ent.*, IV, 25; 1928, *Ann. Mus. nat. Hungar.*, XVI, 152, 168, 185.

1926. *Eumyiospila spinifemorata* Mall., *Philipp. J. Sci.*, XXXI, 499, 500. Type: Mt. Maquiling. Mus. Washington ? n. syn.

1935. *Eumydaea argentata* (Walk.), Karl, *Arb. morph. taxon. Ent.*, II, 41.

Fuscous with pale ferruginous scutellum, the dorsal surface of which is largely infuscated, legs (but piceous tarsi), apex of fourth abdominal segment and in male first and base of second abdominal segment; intermediate tergites with large paired dark spots; shoulders and parts of the piceous pleurae more or less pale translucent; apex of second and base of third antennal segment more or less pale ferruginous. *Head* with whitish-grey dust, face and parafrontalia dusted more silver-white, especially in male; eyes bare, in male contiguous, interfrontalia largely obsolete, visible only as a minute triangle above and as a slightly larger one at lunula, parafrontalia narrowly band-shaped, separating the eyes by about $\frac{1}{15}$ head-width, with 5–8 inclinate setae, which quickly become smaller posteriorly, on anterior three-fifths and a quite conspicuous small proclinate seta near anterior ocellus, ocellars moderately strong, verticals fine and moderately short, but not very clearly differentiated; frons in female not quite a quarter (0·23–0·24) head-width at vertex, moderately dilated with almost straight (very slightly convex) sides to lunula, where it is almost a third (0·32) head-width, frontal triangle moderately densely dusted whitish-grey, hardly shining, apex drawn out almost to lunula, interfrontalia moderately narrowed to extremities, thrice as wide at middle as a parafrontale, the latter with 2–3 inclinate setae, which alternate with small setae, and, on outer part, with about 3–4 proclinate setulae, ocellars and verticals strong; parafacialia over a third (♀) to over half (♂), jowls approximately, as wide as third antennal segment, the latter falling

short of mouth-margin by a third its own width; arista rather densely long-plumose, rays slowly becoming shorter from about middle onwards, longest rays 2 (♀)–2½ (♂) times as long as width of third antennal segment. *Thorax* moderately densely dusted pale grey, the dust anteriorly with a slight bluish tinge, posteriorly and near median line more yellowish or brownish, paramedian vittae fuscous, overlaid with brown, conspicuous, almost reaching third *post dc* and, in a posterior view, even scutellar suture, outer vittae more or less pale-dusted and faint; *prsc* rather weak, *pra* short but distinct, a similar seta close by; anterior mesopleural conspicuous, anterior lower *stpl* more or less indistinct, hypopleura bare. *Abdomen* rather densely dusted cinereous-grey, median part of first and a large paired spot on second and third segments dusted brown, these spots in male in posterior view largely fuscous, fourth segment sometimes with similar smaller spots, the spots of the intermediate segments sometimes extended almost over the whole dorsal surface, so that the abdomen is suggestive of certain *Xenosina*; setae as in *pellucida*. *Wings* subhyaline with a brownish, near base more ochraceous, tinge, veins testaceous; r_1 and *r-m* as in *pellucida*, r_{4+5} rather markedly sinuous at apex, setulae not or not much exceeding node, *m* markedly upcurved at apex. Calyptrae pale brownish-grey, subopaque, with pale ochraceous border and pale golden fringe. *Legs:* Femora in male with an *av* row of short, strong, pointed black setae, of which only a few and sometimes none are present on apical third of fore femur, but a dense row occupying about the apical half or third on posterior femora (Fig. 114); there is no trace of

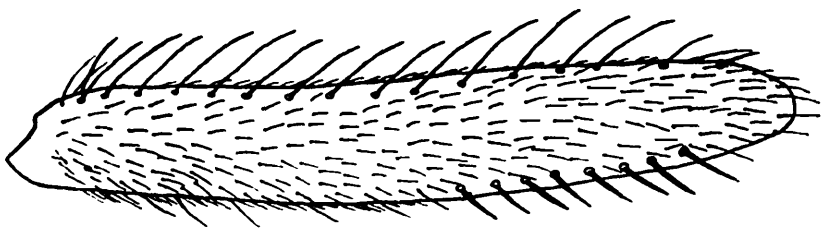


FIG. 114. *Mydaea* (*Eumyiospila*) *argentata* (Walk.), ♂, anterior view of hind femur.

these combs on the front femur of the female; mid femur with some weak *av* setae and 3–5 strong *pv* setae on basal two-fifths, apical half of *av* surface in female with a row or fringe of stronger half-decumbent setulae, mid tibia with 2 strong *p* setae; hind femur with 2–3 weak *pv* setae on basal third or two-fifths and with a row of more (♂) or less (♀) dense decumbent *pv* setulae on about apical two-fifths, *av* surface

with some weak and short setae near base and, in female, 3–5 strong setae near apex, hind tibia with a strong *ad* and *av* seta.

Length.—4·6–8·6 mm., of wings 5·0–8·4 mm.

Distribution.—CEYLON. S. INDIA (Shevaroys; Kallar; Palni Hills; Nilgiri Hills; Bangalore). N.E. BURMA. MALAYA (Pahang; Selangor; Perak; Kedah). THAILAND. FORMOSA. PHILIPPINES. SUMATRA. CELEBES.

Walker's three names were correctly synonymized by Stein (1919, *Arch. Natgesch.*, **LXXXIII**, A 1, pp. 116–123). Malloch did not realize that *argentata* was related to his *Eumyiospila spinifemorata* when he described the latter, and he did not compare these species. His description and specimens identified by him, including the THAILAND paratype, tally completely with Walker's types, except that in the description the femora are said to be blackish. This contradicts Malloch's key on p. 499, according to which the femora in both sexes are 'honey yellow', and the specimens bearing his identification labels confirm that the key is right. The statement giving the width of the vertex in the female as one-sixth head-width must also be due to an error. The present species is apparently *Mydaea contraria* Walk. = *spinipes* Stein of Malloch (1922, *Ann. Mag. n. H.* (9), **X**, p. 379), and following his identification I have formerly labelled specimens '*spinipes* Stein', but examples later named *contraria* by Malloch are *pellucida* Stein. In actual fact the type of *Aricia contraria* Walk., as selected by Stein, which is in the B.M., is a *Dichaetomyia*, and the pair of Walker paratypes separated as *spinipes* by Stein cannot be found. The 'continuierliche Reihe ziemlich langer and starker Borsten' on the hind femur might at first sight appear suggestive of *argentata*, but the details especially of the other strong setae of the hind femora (as in some *Hydrotaea* and *Fannia*) exclude completely any possibility of identifying *spinipes* Stein with *argentata*. I have not seen anything that might be interpreted as *spinipes*, and, moreover, the name has been omitted from Stein's (1919) and Séguy's (1937) catalogues.

In Dr. Keiser's Ceylon collection a good series of *M. argentata* and a small number of *M. pellucida* have recently come to hand. They show that at least in Ceylon the two forms are not always separable, as each character, including the femoral combs of the male and the *post dc*, may present itself in a transitional condition. Unless this is a case of ready hybridization—the male genitalia are indistinguishable—it would appear that *pellucida* is only a small form of *argentata*.

Genus 35. **Helina** Robineau-Desvoidy.

1830. *Helina* R.-D., *Myod.*, 493. Genotype: *H.* (*euphemioidea* R.-D. =) *pertusa* Meig.
1830. *Aricia* R.-D., *Myod.*, 486 (nec Savigny 1817). Genotype: *A.* (*impunctata* R.-D. =) *impuncta* Fln.
1835. *Spilogaster* Macq., *Suites à Buffon*, II, 293. Genotype: *Musca quadrum* F.
1889. sbg. *Hebecnema* Schnabl, *Hor. Soc. Ent. Ross.*, XXIII, 331. Genotype: *Anthomyia umbratica* Meigen.
1911. *Spilaria* Schnabl and Dziedzicki, *Nova Acta Leopold. Car. Akad.*, XCV, 160. Genotype: *Spilogaster pubescens* Stein.
1921. sbg. *Euspilaria* Mall., *Ann. Mag. n. H.* (9), VIII, 226; Emden, 1915, *B.M. Ruwenzori Exp. 1934-35*, II, 613. Genotype: *Euspilaria* (*fuscorufa* Mall. =) *dorsalis* Stein.
1926. sbg. *Helinella* Mall., *Philipp. J. Sci.*, XXXI, 498. Genotype: *Mydaea* (*propinqua* Stein =) *lenticeps* Thoms.

Head much higher than long; eyes of male as a rule subcontiguous or contiguous, seldom widely separated; frons of female wide, without cruciate interfrontal* or proclinate orbital setae; parafacialia bare; arista short-plumose to long-plumose. *Thorax* with a distinct *pra*, except in subgenus *Hebecnema* where it is small or absent; prosternum bare, except in *cashmirensis*; propleural depression and pteropleura bare, 1+2 or 2+2 *stpl*, metathoracic spiracle without black setulae. *Abdomen* subelongate to short-ovate; anterior segments without or with weak median marginals, lateral marginals of anterior segments and setae of posterior segments stronger. *Wings* with r_1 bare, dorsal surface of r_{4+5} entirely bare except for some minute hairs in certain *Hebecnema*, *m* never strongly upcurved at tip, usually straight or even a little curved backward. Lower calyptra of *Phaonia* type. *Legs:* Mid femur with an *a* pre-apical (except as a rule in *H. lucorum*); hind tibia without a single *pd* seta between three-fifths and four-fifths of length, *ad* pre-apical seta as a rule well developed and longer than tibial diameter.

Distribution.—World-wide, extending in the North to Lapland, Iceland, Labrador and the Behring Strait, in the South to the Falkland Islands, the Cape and Tasmania.

Biology.—Adults of European species are found on flowers, vegetation (this applies to the Oriental *appendiculata* and *umbratica*), tree trunks, etc., those of *H.* (*Hebecnema*) *umbratica* often licking blood of mammals which oozes from wounds caused by *Stomoxys*, Tabanids, etc. It may be that *H. nigrithorax* has similar habits, as it has several times been

* These are abnormally present in a specimen of *H. lenticeps*.

found in a cattle shed at Kuala Lumpur. At Kasauli in dry hot weather *H.* (s. str.) *uliginosa* has been found sheltering in enormous numbers in houses, sitting quietly on walls, beds, etc., without bothering anyone. They left at sunset and returned in the morning (Malloch, 1922). Both sexes of the species of subgenus *Hebecnema* are commonly found on dung like those of *Mydaea*, and the eggs (Fig. 8*w*), which are of the flanged type, are deposited on the dung (Thomson, 1937, *Parasitol.*, **XXIX**, p. 315). The larvae hatch in the second stage, which is coprophagous and short-lived, the third-stage larvae being obligatory carnivores. In *Helina* itself the eggs appear to be undescribed; the larvae live in rotting vegetable matter, often decaying wood. They, too, are carnivorous, and some species spin a cocoon of silk and debris before pupating. The larvae of an African species of subgenus *Euspilaria* have been found in decomposing caterpillars (Cuthbertson, 1934, *Proc. Rhodesia sci. Ass.*, **XXXIII**, p. 35), and those of *H.* (*Helinella*) *lenticeps* are frequently found in vegetable matter, e.g. an unopened injured leaf of the African oil palm, in stems of the tobacco plant, in fruits of *Psidium guava*, carambola (*Averrhoa carambola*) and pumpkin (*Cucurbita*), etc. In many cases, if not all, rotten matter is concerned (*see* van Emden, 1951, *B.M. Ruwenzori Exped., 1934-35*, **II**, p. 639).

According to Hennig (1952, *Beitr. Ent.*, **II**, p. 85) *Mydaea sordida* Stein belongs to subgenus *Helinella*. However, Stein describes the upper and under side of r_{4+5} as setulose, and the characters given by him do not seem to indicate a member of the present genus. The original description was based on a single male of the Budapest Museum, and the 'Typus im Zoologischen Museum Berlin', on which Hennig's statement is based, can only be a specimen subsequently identified as *sordida*.

Key to the Species of Helina.

1 (16) Node at base of r_{4+5} setulose on ventral surface, if bare or apparently bare the *ad* pre-apical of hind tibia hardly as long as tibial diameter and at the same time *pra* absent. *pra* small or absent. Fore tibia without a *p* submedian seta; mid tibia without *av* or *ad* setae; hind tibia without *pd* setae.

2 (13) *pra* absent or indistinct or small. *ad* pre-apical of hind tibia hardly as long as tibial diameter. Setulae on node always very small if

present. Small species with fuscous-brown inconspicuously dusted thorax and at least the femora dark. Auxiliary prostigmal absent or hair-like (subgenus *Hebecnema* Schnabl.).

3 (6) Only 3 *post dc.* Eyes practically bare.

4 (5) Wholly fuscous-brown, mesonotum thinly dusted brown, abdominal segments of male with a narrow dark undusted median vitta. Halteres fuscous. Calyptrae brownish with brown border and fringe. Node bare... ... .. . *trichaeta* sp. n., p. 502

5 (4) Abdomen and shoulders pale ferruginous, mesonotum fuscous-brown with bluish-grey dust. Halteres reddish-yellow. Calyptrae greyish with pale yellow border and fringe. Node setulose on under side. *trisetosa* sp. n., p. 503

6 (3) 4 *post dc.*

7 (8) Halteres, antennae, shoulders, abdomen, border and fringe of calyptrae fuscous;* in male second tergite with a pair of elongate undusted paramedian spots (Fig. 115), which form an extension of the median spot of the first tergite. Hind femur with 3–4 long *pv* setae near middle and some strong *av* near apex.. .. . *halterata* Stein, p. 504

8 (7) Halteres pale yellow to dull reddish-yellow.

9 (10) Node at base of r_{4+5} with some minute setulae (usually both above and below). Abdomen largely or wholly translucent testaceous without paired dorsal spots. Thorax thinly dusted greyish-brown, without distinct vittae though the dusted disc is rather sharply delimited at the line of the *ia*. Eyes practically bare. Wings in male evenly somewhat browned.... ... *nigrithorax* (Stein), p. 507

10 (9) Node at base of r_{4+5} without setulae. Abdomen wholly dark.

11 (12) Abdomen with an undusted blackish median vitta at least on second segment; in ♀ this vitta is less sharply defined but broader.

---

* In two females from Kambaiti border and fringe of the calyptrae yellowish-white, the calyptrae whitish, and the node at base of r_{4+5} quite bare, *see* p. 506.

Thorax with faint but distinct vittae. Eyes conspicuously hairy, the hairs long in male, very short but dense in female. Tibiae dark brown.. *umbratica* (Meig.), p. 508

12 (11) Abdomen without an undusted dark median vitta on second and following segments though in male in some directions with a brownish shadow on median line. Thorax without distinct vittae, hairs short, rather strong, and not very numerous, *acr* in only 3–4 rows in front of suture. Eyes almost bare. Posterior tibiae translucent ferruginous. . . . . *pseudofumosa* sp. n., p. 510

13 (2) *pra* present but weak, sometimes indistinct or even absent. *ad* pre-apical of hind tibia somewhat longer than tibial diameter. In Oriental species: Legs always pale; either only 3 *post dc* strong, or auxiliary prostigmal (dorsad to the upcurved main prostigmal) strong (subgenus *Helinella* Mall.).

14 (15) 3 strong *post dc*; in addition a weak or indistinct fourth *post dc* present between suture and the first. Eyes almost bare. Costal spine short but distinct; *m* quite conspicuously (though not strongly) upcurved at apex. Anterior *ia* less than half length of posterior one; auxiliary prostigmal weak. Thorax largely fuscous, densely dusted pale grey, paramedian fuscous-black vittae approaching level of second strong *post dc*; pleurae largely or wholly fuscous. Scutellum without distinct discal setae..... *lenticeps* (Thoms.), p. 511

15 (14) 4 strong *post dc*. Eyes densely hairy. Costal spine absent; *m* very slightly curved backward at tip, almost straight. Anterior *ia* hardly weaker than posterior one; auxiliary prostigmal strong. Body fuscous-black, rather thinly dusted grey, thoracic vittae hardly visible behind suture, abdomen with a linear median vitta... .. *fuscisquama* (Stein), p. 514

16 (1) Node at base of r_{4+5} bare on both dorsal and ventral surfaces. *ad* pre-apical of hind tibia longer than

tibial diameter; *pra* normally distinct.

17 (24) Scutellum with setulae or hairs near ventrolateral margin. Auxiliary prostigmal strong. Mid femur with 2–6 strong *pv* setae on basal half. *pra* small.

18 (23) Hairs along ventral edge of scutellum similar to those on dorsal surface, i.e. black and decumbent, present along edge and on lower part of lateral surface. Anterior *ia* only slightly behind level of first *post dc*. Notopleura with some setulose hairs in addition to the setae, hypopleura with fine hairs (pale in *coronata*) along fore margin of spiracle (subgenus *Euspilaria* Mall.).

19 (20) 3 strong *post dc*. 1+2 *stpl*, arranged in an isosceles triangle. Lateral part of mesonotum to beyond *sa*, most of scutellum, pleurae (wholly or almost wholly), and legs, except tarsi, pale ferruginous. Eyes inconspicuously short-haired. Metathoracic spiracle with an irregular row of black hairs along margin. *r-m* and *m-m* not suffused; costal spine normally much longer than *r-m*. Mid femur with an *a* pre-apical.. . . . *coronata* (Stein), p. 515

20 (19) 4 strong *post dc*. 2+2 *stpl*, the lower posterior much closer to the upper posterior than to the upper anterior one. *Thorax* and legs wholly fuscous-black, at most base of femora and the tibiae reddish. Eyes densely long-haired, especially in male. Metathoracic spiracle without black hairs along margin. *r-m* and *m-m* suffused; costal spine inconspicuous, adpressed, though about as long as *r-m*.

21 (22) *ad* surface of hind tibia with 3 or more setae. Fore tibia without a *p* seta. Dark thoracic vittae broad, fuscous and in places showing shifting reflections. Mid femur without an *a* pre-apical.. *nemorum* (Stein), p. 517

22 (21) *ad* surface of hind tibia with only 2 setae. Fore tibia with a *p* seta, at least in female. Thorax more evenly dusted, vittae narrower and more sharply defined, abdominal spots smaller and less

shifting. Mid femur with an *a* pre-apical.... . *lucorum* (Fln.), p. 519

23 (18) Hairs along ventral edge of scutellum different from those on dorsal surface, pale, very fine and erect (as in *ANTHOMYIINAE*), only invading the edge and mainly present on under side. Anterior *ia* only slightly anterior to level of second *post dc*. Notopleura bare apart from the two setae; hypopleura almost bare; prosternum with some fine converging hairs. Eyes densely hairy. Mid femur without an *a* pre-apical (subgenus *Helina*, pars)..... *cashmirensis* (Mall.), p. 520

24 (17) Scutellum bare on lower half of lateral surface and on ventral surface. Auxiliary prostigmal small (except in *pellucidiventris*). Notopleura bare except for the two setae, rarely with a stray hair (subgenus *Helina* s. str.).

25 (40) Hind tibia with a small *pd* seta at basal third to fifth.* Mid tibia with 2–4 *p* setae; † hind tibia with 2–3 *av* and (normally) 3 *ad* setae. Abdomen with a pair of round spots on second and third segments, in male often also a pair of smaller oblong spots on the fourth. Costal spine strong. Eyes with short and sparse but quite distinct hairs. *pra* small.

26 (27) Width of arista including plumosity in male greater than length of third antennal segment (Fig. 116), longest rays in both sexes longer than width of that segment. Trochanters, tibiae and posterior femora wholly pale ferruginous, the latter sometimes browned at base. Fore tibia with 1–2 setae. ♂: Frons more than one-third head-width (Fig. 116); superior forceps triangular, wholly pollinose and matt.. . . .... *eurymetopa* sp. n., p. 522

27 (26) Width of arista including plumosity considerably smaller than length

---

* Hind tibia with a *pd* seta near middle. Mid femur without an *a* pre-apical. Hind tibia with the *ad* pre-apical rather small. Mesonotum with three vittae. See *Spilogona*.

† Mid tibia with only 1 *p* seta. Anterior *prst dc* small, hardly half as long as posterior *prst dc*. *stpl* arranged in an isosceles triangle; cf. *pectiniseta*, the female of which may be traced to this paragraph.

of third antennal segment, longest rays not or only slightly longer than width of that segment. ♂ : Frons up to about one-fifth head-width; superior forceps often (or always ?) somewhat trapezoidal, shining, almost glabrous on apical half.

28 (35) Fore tibia with a *p* seta.

29 (30) Calyptrae ochraceous-brown to rusty brown. 4 *post dc.* Pollinosity brown-grey and brown. Larger. ♂ : Legs piceous without distinctive setae and hairs. ♀: Legs wholly reddish-yellow.. *brunneigena* sp. n., p. 523

30 (29) Calyptrae whitish. 3 *post dc.* Pollinosity largely whitish-grey.

31 (32) Trochanters and posterior femora pale ferruginous. Thoracic vittae almost absent in posterior view, only the paramedian ones narrowly visible, no trace of a brown-dusted median vitta behind. ♂ : Interfrontalia dusted whitish-grey; only 3 inclinate setae, which hardly pass anterior third; legs without distinctive bristling. *argentigena* sp. n., p. 525

32 (31) Trochanters and posterior femora piceous or fuscous (♀ of *posteroventralis* unknown). Four dark thoracic vittae conspicuous in posterior view, in addition a distinct brown-dusted median vitta present from scutellar suture to at least level of second *post dc.* ♂ : Interfrontalia dusted brownish, contrasting with parafrontalia; inclinate setae more numerous and reaching or exceeding middle.

33 (34) Mid tibia with about 6–8 setae, 1–2 of which are distinctly in a *pv*, the rest in a *p* and *pd* position. Third tergite with a complete row of discals. ♂ : Hind femur without *pv* setae, the *av* row consisting of short setae on basal half and 5–6 long and strong setae on apical half.. .. *posteroventralis* sp. n., p. 527

34 (33) Mid tibia with only 2–3 *pd* setae, which are arranged in one row. Third tergite with only lateral discals. ♂ : Frons at middle as wide as ocellar tubercle; hind femur in basal half with long dense erect *pv* setae and fine short *av*

hairs, the latter becoming longer towards middle, apical half with a row of long dense *av* setae; fourth ventrite with two long strong closely adjacent setae on each side. *pectinifemorata* sp. n., p. 528

35 (28) Fore tibia without a *p* seta. *post dc* apparently variable, 3–4 pairs present. Longest rays of arista about as long as width of third antennal segment. ♂: Eyes narrowly separated, narrowest part of frons one-half to fully as wide as ocellar tubercle.

36 (37) Anterior lower *stpl* very weak, up to about half length of anterior upper one. ♂: Ventrites 1–3 unusually broad, 2–3 wider than long, 1–4 undusted glossy and with long and fine erect hairs; halteres infuscated. ? ♀: Halteres pale reddish-yellow.. *infranitens* sp. n., p. 530

37 (36) Anterior lower *stpl* strong, more than two-thirds length of anterior upper one. ♂: Ventrites conspicuously longer than wide, largely or wholly dusted grey and with normal setae and setulae; halteres pale reddish-yellow as in female (♀ ♀ not distinguishable).

38 (39) ♂: Hind femur (Fig. 118) with numerous long fine erect hairs on *v* surfaces, apical half of *av* surface with longer and stronger setae. *hirtifemorata* Mall., p. 532

39 (38) ♂: Hind femur (Fig. 119) without long fine erect hairs on *v* surfaces, but with a row of short, stiff setae on basal half and of long strong slightly curved setae on apical half of *av* surface. *appendiculata* (Stein), p. 534

40 (25) Hind tibia without a *pd* seta. 2+2 *stpl*. Fore tibia usually without a *p* seta.

41 (44) *pra* very small or absent, up to about one-half length of second *npl*. 3 *post dc*. Longest rays of arista about as long as width of third antennal segment or longer. Space between paramedian vittae dusted grey, the dust generally somewhat brownish behind suture. *acr* hairs in front of suture arranged in 4 rows between the

paramedian vittae.* These vittae rather conspicuously dusted brown behind suture, unusually short. *r-m* and node at base of r_{4+5} markedly browned (but not or hardly suffused).

42 (43) Palpi, basal antennal segments and femora, the latter wholly, or mostly, pale ferruginous. Apex of scutellum and greater basal part of abdomen pale testaceous translucent, in female pale colouration of abdomen often much reduced. ♂ : Eyes separated by width of ocellar tubercle. *uliginosa* (Fln.), p. 535

43 (42) Palpi and antennae fuscous, femora piceous-brown, apex suffusedly pale ferruginous. Ground-colour of scutellum and abdomen wholly fuscous-black. ♂ : Eyes contiguous... .. . . .. *nervosa* (Stein), p. 537

44 (41) *pra* subequal to second *npl.* 4 strong *post dc.*

45 (46) Legs pale ferruginous with dark tarsi. Eyes short-haired (♀ only ?). Abdomen unspotted (♀ only ?). *r-m* and *m-m* only slightly suffused. Longest rays of arista about half as long as width of third antennal segment. Space between paramedian vittae conspicuously dusted brown *breviplumosa* sp. n., p. 539

46 (45) Legs fuscous-black with the tibiae mostly pale ferruginous. Eyes densely long-haired even in female. Second and third abdominal segments with large though not very sharply defined brown-dusted paired spots. *r-m* and *m-m* strongly suffused. *tibiella*, (Stein), p. 540

Subgenus **Hebecnema** Schnabl.

Distinguished from *Helina* s. str. and the other subgenera by the absence of a *pra*. However, this seta is sometimes absent in *Helina*, and a small *pra* is present in some *Hebecnema*. The European forms are usually regarded as a separate genus, and Ringdahl (*personal communication*) considers this to be more closely related to *Mydaea* than to

* *acr* hairs in front of suture forming only 1–2 irregular rows between the paramedian vittae. ♂ dichoptic. See *eurymetopa* sp. n., of which I have seen a specimen without a *pd* seta on either hind tibia.

Helina. The biology and the occurrence of setulae on both the dorsal and ventral surfaces of the node in some species would seem to support this view, but *Helina* and *Mydaea* are very close to each other anyhow, and the aggregates can rather more easily be defined in the way here adopted.

229. **Helina (Hebecnema) trichaeta** sp. n.

♂ ♀ : Shining piceous-black with thin brown dust, tibiae and extreme tip of femora translucent reddish-brown, especially in female. *Head* with the face matt, brown-dusted, only mouth-margin somewhat shining; eyes with extremely short hairs, contiguous in male, where the interfrontalia are obsolete in upper half but conspicuous as a somewhat oblong triangle in lower half, parafrontalia linear in upper, rather strongly dilated in lower half, with 3–4 inclinate setae on anterior half, which strongly decrease in size posteriorly, ocellars not very strong, verticals fine but rather distinct; frons of female three-tenths (0·28–0·32) head-width at vertex, rather strongly dilated with almost straight sides to lunula where it is two-fifths (0·39–0·41) head-width, frontal triangle thinly dusted brown, slightly shining, fading out near lunula, interfrontalia markedly narrowed from middle to extremities, four times as wide at middle as a parafrontale, the latter with 3 strong and 0–1 weak inclinate setae on anterior half and a few small proclinate setulae on outer part, ocellars and verticals strong; parafacialia $\frac{1}{2}$–$\frac{1}{3}$, jowls fully, width of third antennal segment, the latter almost or quite reaching mouth-margin; arista not very densely plumose, rays quickly becoming shorter from apical fifth onward, longest rays slightly longer than width of third antennal segment. *Thorax* with the *acr* arranged in 3–4 longitudinal rows, the outer pair of rows stronger, the inner 1–2 rows consisting of small hairs, *prsc* rather weak, anterior *prst dc* half as long as posterior, the three *post dc* strong, *ia* not very strong, *pra* hair-like or very weak; anterior mesopleural weak, auxiliary prostigmal absent, 1+2, 2+2 or 2+3 *stpl*, the lower anterior weak where present, hypopleura bare. *Abdomen* thinly dusted greyish-brown, rather shining, especially in female, in male with a narrow undusted median vitta; second segment of male with fine marginals extending from lateral surface almost to middle, third in male with a complete row of fine discals and rather strong marginals, fourth with a row of strong discals and marginals, in female second segment without distinct median marginals and third without distinct median discals. *Wings* greyish subhyaline, somewhat infuscated, especially in male,

veins brown; r_1 slightly exceeding level of *r-m*, which lies beyond middle and, in male, at almost three-fifths of discal cell; r_{4+5} and *m* very slightly converging or parallel, the former quite bare on under side, not sinuous, the latter straight or very slightly upcurved at tip; *m-m* upright and almost straight. Calyptrae greyish-brown with brown border and brown-golden fringe, lower one subopaque. *Legs:* Mid femur with 3–4 weak *pv* setae in basal third, mid tibia with 2 *p* setae, hind femur with 3–4 strong *av* setae near apex, otherwise at the most with some very short and weak *av* setae nearer base.

Length.—4·5–5·5 mm., of wings 4·7–5·5 mm.

Distribution.—S. INDIA: Naduvatam, Nilgiri Hills, IX.50 (*P. S. Nathan*), ♂ type (in B.M.); 1 ♂ paratype (in coll. P. Arnaud); Kodaikanal, Palni Hills, IV.53 (*P. S. Nathan*), 1 ♀ paratype (in coll. P. Arnaud); Shembaganur, 6,000 ft., nr. Kodaikanal, 30.III.36 (*B.M.-C.M. Exped. to S. India, 1936*), 1 ♀ paratype (in B.M.).

Malloch (1928, *Ent. Mitt.*, **XVII**, p. 327) suspected that because of its three pairs of *post dc*, *H. nitens* Stein from Java does not belong to *Hebecnema*. The discovery of the present and following species seems to confirm Stein's opinion about his *nitens*, with which the present species tallies in the fuscous halteres, dark legs, etc. *H. nitens* differs from *trichaeta* by the absence of any trace of dusting and the presence of some long *pv* setae on apical half of hind femur.

230. **Helina (Hebecnema) trisetosa** sp. n.

♂: Head and thorax fuscous-black, moderately densely dusted pale grey, shoulders and abdomen pale ferruginous, antennae pale orange-yellow. *Head:* Eyes with extremely short sparse hairs and markedly enlarged anterior facets, closely contiguous, interfrontalia obsolete, parafrontalia linear on more than upper half, slightly broadened to lunula, anterior third with two small inclinate setae separated by a setula, second third with 3–4 small proclinate setulae, a small reclinate setula at dorsal fourth, ocellars rather weak, verticals very small but distinct, parafacialia linear, jowls as wide as third antennal segment, the latter reaching mouth-margin; arista long-plumose, rays slowly decreasing in length in apical half, longest rays fully twice as long as width of third antennal segment. *Thorax* without distinct undusted vittae, the pruinosity appearing somewhat bluish in certain directions; *prsc* weak, anterior *prst dc* conspicuously shorter than posterior one, the two *ia* rather short, *pra* small but very distinct,

about half as long as second *npl*, anterior mesopleural absent, auxiliary prostigmal absent, 1+2 *stpl*, hypopleura with a few fine setulose hairs above coxa; metathoracic spiracle with two black bristles at most ventral part. *Abdomen* subcircular in outline, with the normal decumbent black hair, very thinly dusted pale brown, shining, anterior segments with small lateral marginals and discals, third and fourth with stronger lateral discals, fourth with a complete row, third with some median (3 in type) and some lateral strong discals. *Wings* subhyaline with a slight ochraceous tinge, veins light brown, on basal half largely testaceous, r_1 distinctly exceeding level of *r-m*, which lies at almost three-fifths of discal cell, r_{4+5} with 2–3 blackish setulae at base, apical half gently curved backward, not sinuous, *m* very slightly upcurved at tip, both slightly converging at tip; *m-m* straight, somewhat oblique. Calyptrae pale yellowish-grey with concolorous border and pale golden fringe, lower one subopaque. *Legs* wholly piceous-brown, mid femur with some erect *av* setulae and 2–3 *pv* setae on basal third, *a* pre-apical small but distinct and doubled, mid tibia with 2 strong *p* setae; hind femur with 2 strong *av* setae on basal, and 3–4 on apical, two-fifths, and a strong *pv* beyond basal third, hind tibia with 1 *ad* and 1 *av* seta.

Length.—3·8 mm., of wings 4·0 mm.

Distribution.—MALAYA: Kedah Peak, 3,300 ft., 15.III.28 (*H. M. Pendlebury*), ♂ type (in B.M.).

The setulose under side of the node in conjunction with size, colouration, *av* seta of mid femora, etc. etc., do not allow this species to be placed in any other genus, but the presence of a distinct *pra* contributes to the difficulty of separating *Hebecnema* from the related groups.

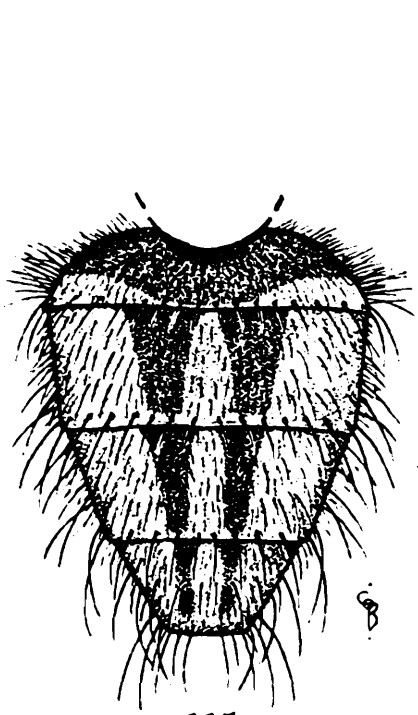
231. **Helina (Hebecnema) halterata** Stein.

(Fig. 115)

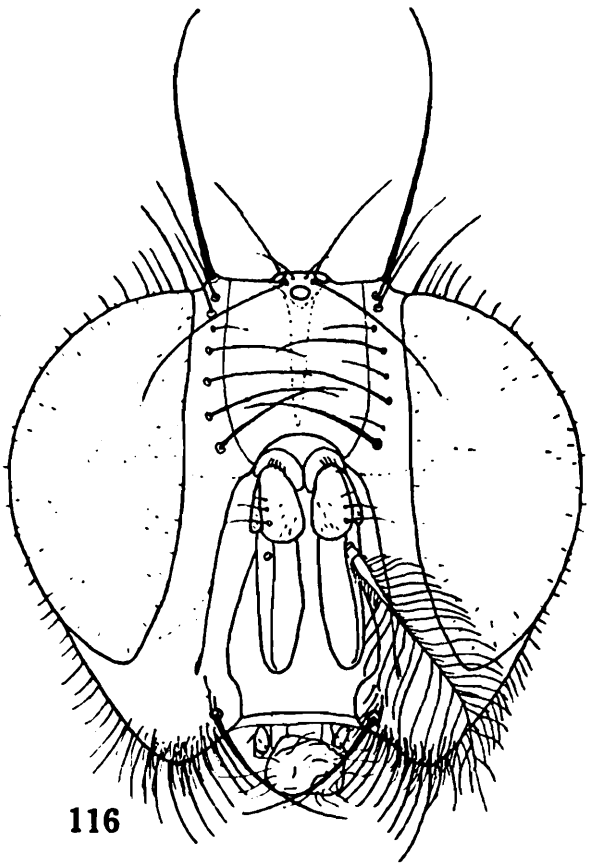
1910. ! *Hebecnema halterata* Stein, *Ann. Mus. nat. Hungar.*, VIII, 546; Mall., 1928, *Ent. Mitt.*, XVII, 326, 327. Type: Pattipola. Mus. Budapest.

Wholly piceous-brown with thin (in female very thin) brown dust, tibiae testaceous to brown. *Head* rather densely dusted greyish-brown in front, lunula yellowish translucent; eyes in male almost bare, with somewhat enlarged upper anterior facets, contiguous or virtually so at or just above middle of frons, interfrontalia visible above at most as a

minute triangle but forming a moderately broad triangle in anterior half, parafrontalia strictly linear in more than upper half but strongly broadened to lunula, on anterior quarter with 2 more or less strong inclinate setae and about 2 setulae, ocellars small, verticals indistinct, frons of female almost a third (0·29–0·33) head-width at vertex, evenly dilated with almost straight sides to lunula, where it is less than two-fifths (0·35–0·39) head-width, frontal triangle slightly embossed, shining, somewhat brassy, narrow, reaching lunula, interfrontalia somewhat narrowed at extremities, more than



115



116

FIG. 115. *Helina* (*Hebecnema*) *halterata* (Meig.), abdomen of male.
FIG. 116. *Helina eurymetopa* sp. n., head of male type.

four times as wide at middle as a parafrontale, the latter with 3 strong and 2–3 weak inclinate setae and, on outer part, with a row of very small proclinate setulae, ocellars and verticals strong; parafacialia linear or almost so, jowls about as wide as third antennal segment, the latter almost reaching mouth-margin; arista plumose, the rays slowly becoming shorter from middle onwards, longest rays slightly longer than width of third antennal segment. *Thorax* without undusted vittae, with rather weak *prsc*, *acr* in front of suture in four longitudinal rows, outer ones distinctly stronger and separated from

the 2+4 strong *dc* by a bare strip, *ia* rather weak, *pra* hair-like; anterior mesopleural distinct, auxiliary prostigmal absent, 1+2 *stpl*, sometimes a weak lower anterior one developed, hypopleura bare. *Abdomen* in female glossy and evenly thinly dusted with brassy reflections; in male in posterior view rather densely dusted greyish-brown, second and third segments with a pair of undusted elongate parallel paramedian spots (Fig. 115), which may or may not reach the hind margin of the segments; anterior segments with rather conspicuous lateral marginals and less distinct lateral discals, third with an incomplete row of discals and a complete row of strong marginals, fourth with a row of strong, in female weaker, discals and marginals, the discals in female indistinct near middle. Calyptrae dull grey, subopaque. *Wings* sub-hyaline, in male strongly, in female slightly, smoky, veins brown or dark brown, r_1 distinctly exceeding level of *r-m*, which lies beyond middle or slightly beyond three-fifths of discal cell, r_{4+5} setulose at base both dorsally and ventrally, very slightly curved backward to apex, *m* very slightly and gradually upcurved towards apex, *m-m* rather upright, slightly concave outwardly. *Legs:* Middle leg as in *trisetosa*, but *pv* setae of femur weak and only one *a* pre-apical present; hind femur with a row of short *av* setae on basal three-fifths and 2–5 strong ones on apical two-fifths and with 2–5 rather strong *pv* setae on basal three-fifths, hind tibia with an *ad* and an *av* seta.

Length.—3·7–4·7 mm., of wings 4·0–4·7 mm.

Distribution.—CEYLON (type seen). S. INDIA (Nilgiri Hills). N.E. BURMA (Kambaiti). MALAYA (Pahang). PHILIPPINES (Negros).

Stein (1919, *Arch. Natgesch.*, **LXXXIII**, A 1, p. 115) and, following him, Séguy (1937, *Gen. Ins.*, pt. 205, p. 278) mention AUSTRALIA as a locality, but it is clear from Stein's reference that this is due to an error, and that the locality should be CEYLON. *H. luzonensis* Malloch from the Philippines is apparently very closely related, but in the male the eyes are separated by a distance equal to the width of the third antennal segment. Two females from Kambaiti also have fuscous halteres. They have the node at the base of r_{4+5} quite bare and whitish calyptrae with pale border and fringe. In the absence of associated males it is difficult to decide whether they are another new species or perhaps the females of *luzonensis* or even a variation of *umbratica*, especially since the eyes have rather numerous short hairs.

232. Helina (Hebecnema) nigrithorax (Stein).

1900. *Spilogaster nigrithorax* Stein, *Term. Füz.*, XXIII, 142. Type: Singapore. Mus. Budapest.
1909. *Hebecnema nigrithorax* (Stein), Stein, *Tijdschr. Ent.*, LII, 223; Mall., 1926, *Philipp. J. Sci.*, XXXI, 501; 1928, *Ent. Mitt.*, XVII, 327.

Fuscous-brown with brown (♂) or brownish-grey (♀) pollinosity and translucent pale testaceous abdomen (often darkened in part by post-mortem influences); shoulders strongly infuscated in male, more or less pale testaceous in female; tibiae and tarsi pale testaceous, antennae testaceous-brown. *Head* moderately densely dusted brownish-grey, eyes bare, in male contiguous with enlarged anterior upper facets, interfrontalia obsolete or linear in upper half but forming a rather broad and short triangle above lunula, parafrontalia linear in upper half, rather strongly dilated to lunula where 2–3 inclinate setae are present, ocellars and verticals very small; frons of female three-tenths head-width at vertex, somewhat dilated with sides almost straight to lunula, where it is well over a third (0·35–0·37) head-width, frontal triangle slightly shining, appearing shagreened, fading out near anterior third of frons, interfrontalia markedly narrowed at extremities, almost six times as wide at middle as a parafrontale, the latter with 3–4 strong, and between them some small, inclinate setae and, on outer part, with a few proclinate setulae, ocellars and verticals strong; parafacialia linear but the concave part adjoining the facial ridges usually exposed and about a third, jowls about equal to, width of third antennal segment, the latter reaching mouth-margin; arista rather densely plumose, the rays becoming quickly shorter only in the apical quarter, longest rays as long as width of third antennal segment. *Thorax* with four rows of *prst acr*, the outer ones longer and separated from the 2+4 rather short *dc* by a bare strip, which does not pass suture, *prsc* small but distinct, both *ia* well developed, a setula between them tending to appear like a third *ia*; anterior mesopleural small but conspicuous, auxiliary prostigmal absent, 1+2 *stpl*, hypopleura bare. *Abdomen* very inconspicuously dusted brownish-white, anterior segments with the marginals becoming more or less conspicuous towards sides, third and fourth with a row of erect and more (♂) or less (♀) strong marginals, fourth also with a row of conspicuous, third of inconspicuous, discals. *Wings* conspicuously smoky in male, paler towards hind margin, r_1 somewhat exceeding level of *r-m*, which lies at $\frac{3}{5}$ or $\frac{2}{3}$ of discal cell; r_{4+5} very gently

curved backward, *m* very slightly upcurved at apex, *m-m* upright and at most slightly concave. Calyptrae strongly infuscated in male, greyish-white with pale ochraceous suffused border in female. Halteres dull reddish-yellow. *Legs:* Mid femur with a small *a* pre-apical and, in basal third, 3–4 short *pv* setae, of which only 1–2 are distinct in female, mid tibia with 2 *p* setae; hind femur without *pv* setae but with 3–5 strong *av* on apical two-fifths or less, hind tibia with one *ad* and one *av* seta.

Length.—3·0–3·7 mm., of wings 3·2–3·7 mm.

Distribution.—CEYLON. INDIA (Assam). SIAM. MALAYA (Singapore; Kuala Lumpur). SUMATRA. JAVA. PHILIPPINE ISLANDS.

A female from Sumatra labelled by E. Jacobson '*Hebecnema nigrithorax* Stein, det. J. R. Malloch, 1928' has dark calyptrae with fuscous margin like the male of *nigrithorax*. It belongs undoubtedly to *H. megophthalma* Mall., which was described from the same locality, especially as the halteres are light brown (in the male of *megophthalma* they are said to be 'dark brown' but are actually coloured as in this female) and the abdomen 'more brownish' The male of *megophthalma* has the anterior facets much more enlarged and the linear portion of the frons much longer than the anterior triangular part. Both these species are very similar to some forms of the African *H. semiflava* Stein, in which the node is setulose only on ventral surface and the tarsi strongly infuscated.

233. **Helina (Hebecnema) umbratica** (Meigen).

1826. *Anthomyia umbratica* Meig., *Syst. Beschr.*, V, 88. Type: Europe. Mus. Vienna.
1928. *Hebecnema umbratica* (Meig.), Mall., *Ent. Mitt.*, XVII, 326, 327.

Piceous-black with thin brown dust, thorax with traces of somewhat irregularly defined incomplete vittae, abdomen in male rather densely dusted greyish-brown with a very narrow dark median vitta, which is often vestigial on third and especially fourth segment, in female more glossy, the median vitta broader but less well defined and not reaching posterior segments. *Head* dusted brownish-grey, parafacialia not distinctly dusted whitish in Oriental specimens; eyes in male subcontiguous, separated by about one-twentieth (but in one of the four Darjeeling males one-twelfth) head-width, interfrontalia linear or narrow in upper half and forming a rather broad triangle at lunula, parafrontalia linear in upper half,

moderately dilated to lunula, on anterior half with 3–4 strong inclinate setae, which alternate with small inclinate setae (in the Darjeeling male with wider frons a small reclinate seta present near level of anterior ocellus), ocellars rather weak, verticals very weak but rather distinct; frons of female well over a third (0·36–0·37) head-width at vertex, moderately dilated with almost straight sides to lunula where it is well over two-fifths (0·43–0·45) head-width, frontal triangle poorly defined, somewhat brownish-dusted and fading out near lunula, interfrontalia markedly narrowed at extremities, 4–5 times as wide at middle as a parafrontale, the latter with 3–4 strong and, alternating with them, 2–3 weak inclinate setae and, on outer part, an irregular row of rather conspicuous black proclinate setulae, ocellars and verticals strong; parafacialia more than half (in Oriental females less than half), jowls almost twice (in Oriental females half again) as wide as third antennal segment, the latter falling short of mouth-margin by half its own width (but in Darjeeling males by almost or fully its own width); arista not very densely short-plumose, rays becoming rather quickly shorter from basal third onwards and extremely short on apical fourth, longest rays not quite as long as width of third antennal segment. *Thorax* with the *acr* as in *nigrithorax*, *prsc* well developed, both *ia* rather strong, *pra* very weak or absent; anterior mesopleural well developed, auxiliary prostigmal variable, hypopleura bare. *Abdomen:* Setae as in *nigrithorax*. *Wings* markedly smoky in male, hardly so in female; r_1 somewhat exceeding level of *r-m*, which lies beyond middle or at three-fifths of discal cell; r_{4+5} and *m* almost straight and parallel near apex, *m-m* rather straight and upright. Calyptrae pale brownish-grey with concolorous border and pale golden fringe. Halteres dull reddish-yellow. *Legs:* Mid femur with a small *a* pre-apical, some erect *av* setulae at base (less numerous in female), and 3–4 *pv* setae on basal two-fifths, mid tibia with 2(–3) strong *p* setae; hind femur without *pv* setae, with 4–6 (♂) or 3–4 (♀) strong *av* setae on less than apical half, hind tibia with 1 *ad* and 1–2 *av* setae.

Length.—4·3–5·1 mm., of wings 4·7–5·3 mm.

Distribution.—INDIA (Darjeeling, 6,000 and 7,000 ft.; Mussoorie; Simla Hills; Dehra Dun Dist.). S. India (Kodaikanal, 7,000 ft.). N.E. BURMA (Kambaiti). HONG KONG. FORMOSA.

Stein (1918, *Ann. Mus. nat. Hungar*, **XVI**, p. 151) with some doubt records *umbratica* from Formosa, and from his remarks it appears that his specimens may belong to a different species, as his male is said to have faint paired abdominal

spots but no median vitta. The only male from Mussoorie has no abdomen and the specimens I have seen from Kodaikanal, Kambaiti, Formosa and Hong Kong are females. All of them have densely-haired eyes and a bare node and do not seem to differ markedly from British *umbratica*. Three males from Darjeeling tally largely with European males, but the Palaearctic element is well known to be conspicuous in the Darjeeling fauna, and a quite definite proof for the occurrence of *umbratica* in the Indian subregion is therefore still missing. All the specimens seen from the Oriental region (including those from Darjeeling and Hong Kong) have a conspicuous erect setula in front of each hind angle of the ventrobasal scale (in one of the Darjeeling male present on one side only). This setula is not found in European specimens.

234. **Helina (Hebecnema) pseudofumosa** sp. n.

♂ ♀ : Piceous-black with piceous legs, posterior tibiae ferruginous translucent, darkened at base. *Head* with moderately dense greyish-brown, on parafacialia more pale grey, dust; eyes practically bare, in male subcontiguous, separated by hardly one-twentieth head-width, anterior facets somewhat enlarged; interfrontalia linear above middle, forming a somewhat elongate triangle below, parafrontalia linear in upper half, somewhat broadened below, where 4–5 inclinate setae are present, which are strong in front and become progressively smaller, ocellars rather weak, verticals small but rather distinct; frons of female a third (0·33) head-width at vertex, gradually dilated with slightly concave sides to lunula, where it is two-fifths (0·40) head-width, frontal triangle not reaching middle of frons but its apex narrowly drawn out to anterior sixth, interfrontalia markedly narrowed to extremities, five times as wide at middle as a parafrontale, the latter with 4 inclinate setae (the second and fourth weak) and on outer part some odd setulae, ocellars and verticals strong; parafacialia less than a third, jowls about equal to, width of third antennal segment, the latter almost (♂) or fully (♀) reaching mouth-margin; arista plumose, the rays becoming quickly shorter on apical third, longest rays a third longer than width of third antennal segment. *Thorax* thinly dusted greyish-brown, without distinct traces of vittae; *prsc acr* in only 3–4 rows, the outer ones stronger and, in male, less widely separated from each other than from the *dc*, *prsc* distinct, both *ia* rather strong, *pra* indistinct; anterior mesopleural indistinct, auxiliary prostigmal hair-like, 2+2 *stpl*, the anterior lower

one rather weak, hypopleura bare. *Abdomen* somewhat shining, in male moderately densely dusted brownish-grey with the indication of a narrow more darkly dusted median vitta, in female thinly and evenly dusted brown; anterior segments with strong (in female not very strong) lateral marginals, third with an interrupted row of discals and a row of strong marginals, fourth with a row of strong discals and marginals. *Wings* greyish hyaline with a very slight brownish tinge; r_1 slightly exceeding *r-m*, which lies at almost three-fifths of discal cell; r_{4+5} and *m* almost straight and parallel at apex, *m-m* almost upright and more or less straight. Calyptrae greyish-white with concolorous border, fringe golden-white. Halteres dull reddish-yellow. *Legs :* Mid femur with 2–3 *pv* setae on basal third and a small *a* pre-apical, mid tibia with 2 strong *p* setae; hind femur without *pv* setae, with 2–3 strong *av* in apical two-fifths, hind tibia with 1 *ad* and 1(–2) *av* setae.

Length.—4·0–4·6 mm., of wings 3·9–4·6 mm.

Distribution.—N.E. BURMA: Kambaiti, 2,000 m., 6.IV.34 (*R. Malaise*), ♂ type (in Mus. Stockholm), 23.V.34, 1 ♀ paratype (in B.M.).

The key characters are similar to those of the European *H. fumosa* (Meigen), but that species has densely hairy eyes, its size is almost twice as great, the antennae are shorter, the apical half of the arista much less plumose and the wings of the male conspicuously smoky.

Sbg. **Helinella** Malloch.

Base of r_{4+5} with some setulae on ventral surface, and *pra* distinct. The former character separates this subgenus sharply from all Oriental and Ethiopian *Helina* and *Euspilaria*, but the European fauna contains a number of genuine *Helina* which have more or less conspicuous setulae on the ventral surface of r_{4+5}.

235. **Helina (Helinella) lenticeps** (Thomson).

1869. ! *Anthomyia lenticeps* Thoms., *Eugenies Resa*, 553. Type: China. Mus. Stockholm.

1900. *Spilogaster propinqua* Stein, *Ann. Mus. Genova*, XX, 386 (nec Storm 1895). Type : Amboina. Mus. Genova (n. syn.)

1918. *Mydaea lauta* Stein, *Ann. Mus. nat. Hungar.*, XVI, 153, 186 (pars: Hong Kong specimens).

1926. *Helinella propinqua* (Stein), Mall., *Philipp. J. Sci.*, **XXXI**, 498.

1951. *Helina* (*Helinella*) *propinqua* (Stein), Emden, *B.M. Ruwenzori Exped.*, **II**, 639.

Fuscous with the base of the abdomen and the lateral surface of the scutellum as a rule more or less broadly pale testaceous translucent, legs, and in female, shoulders, pale ferruginous, sometimes all femora infuscated, front femora of male normally so, antennae pale ferruginous, disc of second segment and third segment from insertion of arista onwards more or less browned. *Head* densely dusted whitish-grey, facial ridges and parafacialia silvery; eyes almost bare, in male contiguous or subcontiguous, separated by less than a twelfth head-width, interfrontalia obsolete or linear, visible as a very narrow small triangle above and a rather small triangle behind lunula, parafrontalia narrow, band-shaped, hardly dilated in front, with about 5–6 inclinate setae from lunula to middle of front, followed by 2–3 inclinate setulae and, just before level of anterior ocellus, a single proclinate setula, ocellars rather weak, verticals weak and rather indistinct; frons of female almost three-tenths (0·28–0·29) head-width at vertex, moderately dilated with almost straight sides to lunula where it is a third to almost two-fifths (0·33–0·38) head-width, frontal triangle thinly dusted grey, almost reaching lunula, interfrontalia somewhat narrowed at extremities, almost thrice as wide at middle as a parafrontale, the latter with 1 very strong and 4–5 weak inclinate setae and, on outer part, with a few small proclinate setulae, ocellars and verticals strong; parafacialia half as wide, jowls half as wide again, as third antennal segment, the latter falling short of mouth-margin by about half its own width; arista densely long-plumose, rays slowly becoming shorter on apical third, longest rays twice as long as width of third antennal segment. *Thorax* densely dusted whitish-grey, the paramedian vittae narrow and widely separated, brown-dusted, often partly fuscous, especially towards neck, outer vittae indistinct in male, narrow, broadly interrupted and rather faint in female, another dark streak from the *prst* and *sa* to anterior end of postalar callosity; *prsc* rather weak, anterior *ia* weak or absent, posterior one rather strong; anterior mesopleural distinct, often double, 1+2 strong *stpl*, the anterior lower one usually also distinct but very fine; hypopleura bare. *Abdomen* densely dusted pale grey, intermediate segments with a pair of roundish brown-dusted spots, apex of fourth usually pale translucent; anterior segments with conspicuous, in female weak, lateral

marginals, third with weak lateral discals and a row of strong marginals and discals.

Wings greyish subhyaline, in male sometimes with a slight yellowish tinge; r_1 slightly exceeding *r-m*, which lies almost three-fifths (♂) or middle (♀) of discal cell, r_{4+5} slightly curved backward and shallowly sinuous, *m* markedly upcurved at apex; *m-m* somewhat oblique and sinuous in male, hardly oblique and somewhat concave in female. Calyptrae greyish-white, in male somewhat ochraceous suffused, border and fringe concolorous. Halteres pale reddish-yellow. *Legs :* Mid femur with somewhat longer hairs on *av* surface, those near base half-erect, and with 3–6 rather strong *pv* setae, mid tibia with 2 strong *p* setae; hind femur with 3–6 strong *av* setae near apex and 1–2 normally weak *pv* in basal third, hind tibia with 1 *ad* and 1 *av* seta.

Length.—5·3–7·7 mm., of wings 5·0–6·9 mm.

Distribution.—CEYLON. INDIA (S. India; United Provinces (Uttar Pradesh); Bihar; Bengal). MALAYA. HONG KONG. CHINA. FORMOSA. PHILIPPINE IS. AMBOINA. ETHIOPIAN REGION (Zanzibar to Sierra Leone and Principe Isl., Kenya and Uganda to Nyasaland).

Through the courtesy of Dr. R. Malaise I have been able to study the type of *Anthomyia lenticeps* Thoms., a species to which Prof. Hennig was good enough to draw my attention. Only the head, without antennae, the left side of the thorax without the scutellum but with one well preserved wing and one hind leg, and a small part of the abdomen are left, but they suffice for establishing the identity of the species beyond any possible doubt. The pteropleura is bare; the metathoracic spiracle is smallish and without black setulae, the dorsal surface of r_1 and r_{4+5} shows no trace (not even pores) of setulae, but the node at the base of r_{4+5} carries on ventral surface three well-developed black setulae. The apex of *m* is markedly upcurved. The *pra* is small but distinct. On the fragment of the mesonotum there are pores of two strong *post dc*, the last of them level with the posterior (small) *sa* and in front of that of the second *ia*, so that a third strong *dc* must have been on the missing posterior part of the mesonotum. In front of the first strong *post dc*, and separated from it by slightly less than half the distance between the two strong *dc*, the pore of a further small *post dc* is seen. The hind tibia has no trace of a *pd* seta but an *ad* and *av* seta, the hind femur 2 weak *pv* setae near base and 4 strong *av* at apex. All these characters are exactly those of *H.* (*Helinella*) *propinqua* (Stein), and I know of no other species to which the type could be referred. The latter name is preoccupied by

Aricia propinqua Storm, and the use of Thomson's name has thus a two-fold justification.

236. **Helina (Helinella) fuscisquama** (Stein).

1910. ! *Mydaea fuscisquama* Stein, *Ann. Mus. nat. Hungar.*, VIII, 553. Type: Pattipola. Mus. Budapest.

Black with thin greyish dust, which is somewhat denser on the parafacialia and parafrontalia; mesonotum in front of suture with an indication of four narrow vittae; antennae and palpi fuscous, fore femur piceous-brown, in ♀ pale ferruginous, tibiae and posterior femora pale ferruginous. *Head:* Eyes densely hairy; in male contiguous, interfrontalia forming a large triangle anteriorly but fading out above middle; parafrontalia with 5–6 moderately strong and some weak inclinate setae on anterior half and a row of setulose hairs between these and ocelli; ocellars long, inner and outer verticals indistinct; frons of female more than a quarter (0·28) head-width at vertex, moderately dilated with slightly concave sides to lunula where it is almost two-fifths (0·39) head-width, frontal triangle somewhat shining, thinly dusted brown, narrow, fading out at anterior fourth of frons, interfrontalia markedly narrowed in front, almost four times as wide at middle as a parafrontale, the latter on anterior three-quarters with 4 strong and 2 weak inclinate setae, ocellars and verticals very strong; jowls with dense and erect setulose hairs, which reach the facial ridges and are upcurved anteriorly (as in *Pogonomyia*); parafacialia less than half, jowls less than twice as wide, in female only a third as wide again, as third antennal segment. Arista short-plumose on basal, short-haired on apical half, longest rays slightly over half as long as width of third antennal segment. *Thorax: acr* hairs very long like the hair generally, in front of suture in about 7 irregular rows, only the *prsc* setiform, moderately strong; 2+4 strong *dc*; both *ia* rather strong; *pra* weak and much shorter than second *npl*, but distinct; auxiliary prostigmal well developed; 2+2 *stpl*, the lower anterior one rather fine but distinct, the lower posterior much closer to the posterior than to the two anterior ones. *Abdomen* in posterior view with an undusted linear median vitta, in postero-lateral view the off-side appears dusted brownish-grey and sharply separated on median line from the seemingly undusted near side; anterior segments with weak (but in male second with conspicuous) lateral marginals, third in female with strong lateral marginals, in male with a strong marginal row, fourth with a row of

strong marginals and discals. *Wings* somewhat (♂) or hardly (♀) smoky; r_1 somewhat exceeding level of *r-m*, the latter strongly oblique, beyond middle of discal cell, *m-m* sinuous and strongly oblique, r_{4+5} and *m* shortly but markedly diverging at extreme tip. Calyptrae, including border and fringe, brown (♂) or ochraceous-grey (♀). Halteres infuscated. *Legs:* Mid femur without an *a* pre-apical but with a row of about 9 long *pv* setae in basal three-fifths and with the hairs longer and more erect at base of *v* and *av* surfaces, mid tibia with 2 strong *p* setae; hind femur with an *ad* and *av* row, the latter consisting of *c.* 12–15 setae, the distal 6–7 of which are longer and stronger, hind tibia with a strong *ad* at middle, a somewhat weaker one beyond it and with an *av* between the levels of the two *ad.*

Length.—6·0–7·2 mm., of wings 5·7–6·9 mm.

Distribution.—CEYLON (Pattipola; Nuwara Eliya). S. INDIA (Kodaikanal, 7,000 ft.).

Described from the ♂ type in the Hungarian National Museum, a male in Mus. Basle, and a pair from Kodaikanal. Stein described the *pra* as absent and the *stpl* as 1+2.

Sbg. **Euspilaria** Malloch.

The black and decumbent hairs along ventral edge of scutellum, which are similar to those of the dorsal surface, seem to define a natural group distributed over the Palaearctic, Oriental and Ethiopian regions. Malloch used the names *Spilaria* S. & D. and *Euspilaria* for this aggregate, unfortunately without selecting a genotype for *Spilaria.* Séguy (1937, *Gen. Ins. fasc.*, 205, p. 292) validly chose *pubescens* Stein, and this action makes *Spilaria* a synonym of *Helina* s. str., leaving *Euspilaria* for the present group.

237. **Helina (Euspilaria) coronata** (Stein).

1915. ! *Mydaea coronata* Stein, *Suppl. ent.*, **IV**, 19. Types: Chip-Chip, Fuhosho, Hoozan and Kosempo. Deutsch. Ent. Inst. Berlin, Mus. Budapest and B.M.

1935. *Helina coronata* (Stein) Karl., *Arb. morph. taxon. Ent.*, **II, 41.**

Fuscous, ground-colour of thorax pale ferruginous, mesonotum rufous-brown on declivous part and fuscous on disc, the latter colouration reaching the *prst* and *ia* laterally, pleurae often with fuscous suffusions; antennae pale ferruginous, second segment browned, third infuscated except at base, palpi brown, apex sometimes suffusedly testaceous; legs pale

ferruginous with piceous tarsi. *Head* densely dusted cinereous-grey, anterior surface dusted greyish-white; eyes sparsely short-haired, in male contiguous with markedly enlarged anterior facets, separated by less than one-twentieth head-width, interfrontalia reduced to a very small triangle above lunula, parafrontalia almost linear, slightly wider in lower half, with 1 strong and 3 smaller inclinate setae, one of them being very small, on anterior third, ocellars strong, verticals very small but quite distinct; frons of female fully a quarter (0·25–0·28) head-width at vertex, evenly broadened with almost straight sides to lunula, where it is well over a third (0·35–0·37) head-width, frontal triangle thinly dusted pale brown, fading out towards lunula, interfrontalia slightly narrowed at extremities, more than thrice as wide at middle as a parafrontale, the latter with 3–5 inclinate setae, of which only 1–2 are strong, and on outer part with some very small proclinate setulae, ocellars and inner verticals very strong, outer verticals moderately strong; parafacialia about three-quarters, jowls one-and-three-quarters, width of third antennal segment, the latter falling short of mouth-margin by almost its own width or more; arista densely long-plumose, rays slowly becoming shorter from middle onwards, longest rays about twice as long as width of third antennal segment. *Thorax* densely dusted pale grey, the dust more brownish near middle, the four vittae rather narrow and rather densely dusted greyish-brown, therefore as a rule only moderately conspicuous, outer ones broadly interrupted; *prsc* rather small, both *ia* very strong, *pra* smaller than second *pl* but conspicuous; anterior mesopleural small; hypopleura with fine pale hairs on upper anterior embossed part and on disc from spiracle to hind coxa. *Abdomen* rather densely dusted pale grey, somewhat shining, usually with a narrow faint dark median vitta, apex of fourth tergite sometimes narrowly pale ferruginous, disc of second and third normally with a pair of large roundish brown-dusted spots; anterior segments with distinct lateral discals and marginals, second in male also with a pair of median marginals, third with lateral discals and a row of strong marginals, fourth with a row of strong discals and marginals. *Wings* subhyaline with a conspicuous ochraceous tinge, first vein reaching level of *r-m*, which in male lies at three-fifths, in female somewhat beyond middle, of discal cell; r_{4+5} slightly curved backward and markedly sinuous, *m* almost straight in apical part; *m-m* hardly oblique, rather strongly concave except at front end. Calyptrae ochraceous-grey with concolorous border, in female often more whitish, fringe pale golden. Halteres reddish-yellow.

Legs: Mid femur with the *av* setulae more erect in basal half or third and with 2–4 strong *pv* setae in basal half, mid tibia with two strong *p* setae; hind femur of male with small *av* setae in basal and 5 strong ones in apical half, of female with weak or indistinct setae in basal three-quarters and 1–3 strong ones near apex, *pv* surface without or with a few very small setae, hind tibia with 2 *ad* and 2–3 *av* setae.

Length.—7·7–9·6 mm., of wings 7·3–9·5 mm.

Distribution.—N.E. INDIA (Khasia Hills). MALAYA (Pahang). SUMATRA. N.E. BURMA (Kambaiti). HONG KONG. FORMOSA. PHILIPPINE IS.

A transitional form between *Euspilaria* and *Helina* in so far as the hair of the eyes and the *stpl* are concerned. In specimens from Malaya the tergites are less densely dusted and the brown-dusted spots usually indistinct or absent.

238. **Helina (Euspilaria) nemorum** (Stein).

1915. ! *Mydaea nemorum* Stein, *Suppl. ent.*, IV, 19; 1918, *Ann. Mus. nat. Hungar.*, XVI, 153, 181. Type: Hoozan. Deutsch. Ent. Institut.

Fuscous-black with rather dense whitish dust, mesonotum with conspicuous fuscous vittae, which are rather broad in male; intermediate tergites with large paired fuscous spots, which are somewhat brown-dusted, and with conspicuous shifting reflections; legs piceous. *Head* rather densely dusted pale grey, parafacialia above with a shifting dark spot, especially in female; eyes in male rather densely long-haired, closely contiguous, interfrontalia obsolete or perfectly linear in upper half and forming a moderately broad triangle in lower half, parafrontalia linear in upper half, rather strongly dilated towards lunula, anterior half with about 10 inclinate setae, which strongly decrease in size posteriorly, ocellars rather weak, verticals very thin but quite long and distinct; frons of female rather variable, about one-third head-width at vertex (0·28–0·36), rather strongly dilated to lunula where it is about two-fifths (0·35–0·46) head-width*, frontal triangle dusted greyish-brown fading out towards lunula, interfrontalia somewhat narrowed to extremities, about four times as wide at middle as a parafrontale, the latter with 3–5 strong inclinate setae on anterior three-fifths and, on outer part, with rather numerous black proclinate setulae, ocellars and verticals strong; parafacialia as wide, jowls fully thrice as wide, as

* The long series from Kambaiti alone varies from 0·35–0·45.

third antennal segment, the latter falling short of mouth-margin by its own width; arista plumose, rays becoming rather quickly shorter on apical third, longest ones half as long again as width of third antennal segment. *Thorax* with the vittae only narrowly interrupted at suture; *prsc* rather long, *dc*, *ia*, *prst*, *ph* and *sa* strong, *pra* short but as a rule very distinct (in some males indistinct), anterior mesopleural distinct. *Abdomen* subovate, in male truncate at apex, paired spots large, in male fuscous, overlaid with thin dust, in female somewhat suffusedly dusted brown; anterior segments with distinct lateral discals and marginals, the second in male with a pair of median marginals and a tendency towards the formation of a marginal row, in female often with a pair of very weak medium marginals, third segment with lateral discals and a row of strong marginals, fourth with a row of strong discals and moderately strong marginals. *Wings* greyish subhyaline with a slight brownish tinge, *r-m* and *m-m* more or less distinctly suffused; r_1 reaching or slightly exceeding level of *r-m*, which lies well beyond middle of discal cell, r_{4+5} slightly curved backward, not or hardly sinuous, somewhat diverging at apex from *m*, which is very gently curved backward; *m-m* strongly sinuous and rather oblique, especially in male. Calyptrae ochraceous-grey, the border ochraceous, more so in male, fringe pale golden. Halteres pale reddish-yellow. *Legs:* Mid femur with erect *av* hairs on basal third, in male with about 6 erect fine *pv* setae on basal half and a fringe of long *pv* hairs from there to apex, in female with 3–4 strong setae on basal third, mid tibia with 4–7 (♂) or 3–4 (♀) *p* setae; hind femur without distinct *pv* setae, in male apical half of *av* surface with 6–8 very long setae; in female apical third with 3–4 strong setae, hind tibia of male on apical three-fifths with a rather dense fringe of strong *ad* setae, and a looser one of somewhat weaker *av* setae, on intermediate half with a row of thin erect *p* setae, hind tibia of female with 3–4 strong *ad* and 2–3 weaker *av* setae.

Length.—5·6–9·4 mm., of wings 5·4–8·4 mm.

Distribution.—FORMOSA (see below), N. INDIA (Simla; Mussoorie). N.E. BURMA (Kambaiti).

Stein separated his Formosan *nemorum* from the European *lucorum* by naked eyes, the absence of a *p* seta from the fore tibia and the greater number of *p* setae on the mid and *ad* on the hind tibia. He saw only 'a few' specimens, and the Sauter collection (Deutsches Entomologisches Institut) contains only three (Hennig, 1941, *Ent. Beih. Berlin-Dahlem*, **VIII**, p. 212). Prof. Hennig has been good enough to send me of these the one which carries Stein's label '*Mydaea*

nemorum sp. n.', which is herewith selected as the type. It has the eyes densely short-haired, but the hairs are of somewhat uneven length as though broken or eaten off, and on the lower part of the left eye there is a patch on which the hairs have retained their normal length (more than half that of width of third antennal segment).

239. **Helina (Euspilaria) lucorum** (Fallén).

1823. *Musca lucorum* Fln., *Dipt.-Suec., Musc.*, 55. Types: Skåne. Mus. Stockholm and Lund.
1903. *Spilogaster lucorum* (Fln.), Stein, *Wien. ent. Zeitg.*, **XXII**, 273.
1921. *Spilaria lucorum* (Meig.), Mall., *Ann. Mag. n. H.* (9), **VIII**, 418.
1951. *Helina* (*Euspilaria*) *lucorum* (Fln.), Emd., *B. M. Ruwenzori Exped.*, **II**, 614 (note).

Fuscous-black, rather densely dusted pale grey, the dust in Oriental specimens as a rule greyish-brown on dorsum, thorax with two pairs of well defined incomplete dark vittae, intermediate abdominal segments with a pair of large roundish dark spots. *Head* moderately densely dusted pale grey, parafacialia and parafrontalia in male silvery, upper part of the latter in female with a shifting dark spot; eyes densely long-haired, the hairs shorter in female; eyes of male contiguous or almost so, interfrontalia obsolete or linear on upper half or less, forming a moderately broad triangle above lunula, parafrontalia linear above, conspicuously dilated towards lunula, anterior half with about 10 stronger and weaker inclinate setae, ocellars rather long but not strong, verticals very thin, rather distinct; frons of female three-tenths head-width at vertex, moderately dilated with almost straight sides to lunula where it is two-fifths (0·39–0·42) head-width, frontal triangle poorly defined, somewhat dusted greyish-brown, fading out towards lunula, interfrontalia somewhat narrowed at extremities, almost four times as wide at middle as a parafrontale, the latter with 4 strong and between them often 1–2 weak inclinate setae, to the outer side of the anterior setae with 1–3 stronger inclinate setulae and, on outer part, a row of small proclinate setulae, ocellars and verticals very strong; parafacialia, jowls and antennae as in *nemorum*. *Thorax* with the vittae rather sharply defined and fuscous in male, more overlaid with brown dust in female, outer ones rather broadly interrupted at suture; *prsc* rather long in male, rather short but conspicuous in female, other setae as in *nemorum*, but *pra* somewhat stronger in male. *Abdomen* as in *nemorum*, the shifting spots usually less conspicuous. *Wings:* Calyptrae

and halteres as in *nemorum*. *Legs:* Fore tibia with 0–2 *p* setae; mid femur as in *nemorum* but the *pv* somewhat stronger, in female 4–5 present on basal half or somewhat more, mid tibia in male with 4–5, in female with (2–)3(–4) *p* setae; hind femur without *pv* setae (or only in female with some very weak ones on basal third), with distinct *av* setae on the entire length, these are numerous in male, thin and rather long in basal half, becoming gradually very long and rather strong towards middle and apex, and less numerous in female, where they are short but quite strong in basal half, the 4–5 of the apical half rather long and strong, hind tibia with 2 strong *ad* setae, in male with about 4 rather long and moderately strong *av* setae on more than apical half and with some erect *p* setulae on intermediate half, in female with 3 strong but not very long *av* setae.

Length.—7·0–8·2 mm., of wings 6·6–7·4 mm.

Distribution.—CEYLON. S. INDIA. N. INDIA (N.W Himalayas; Darjeeling). ADEN. YEMEN. EUROPE. N. AMERICA.

Specimens from Ceylon and Darjeeling in the Brunetti collection (in B.M.) were named *lucorum* by Stein, and there is no doubt that the form at hand represents *lucorum* in the Indian subregion. The pollinosity of the European specimens is, however, markedly more whitish-grey and the frons wider. Moreover, Oriental males as a rule have no *p* seta on the fore tibia, which seta is almost invariably present in European specimens.

Sbg. **Helina** s. str.

Species with the base of r_{4+5} bare on both dorsal and ventral surfaces, *pra* and *ad* pre-apical of hind tibia well developed, and the ventral part of lateral surface of scutellum bare or at most with pale and fine hairs which are quite distinct from those of the dorsal surface. In the Palaearctic region some exceptions with regard to the first of these characters do occur, but none have been discovered in the Oriental region.

240. **Helina** (s. str.) **cashmirensis** (Malloch).

1922. ! *Spilaria cashmirensis* Mall., *Ann. Mag. n. H.* (9), X, 132. Type: Gulmarg. B.M.

Fuscous-black, with moderately dense greyish-white dust, mesonotum with four conspicuous fuscous-black vittae, second and third tergites in male with a pair of roundish brown-dusted spots, second to fourth tergites in addition in both sexes with conspicuous shifting dark spots; legs piceous,

Head rather densely dusted whitish-grey, parafrontalia and parafacialia more silvery, the latter in female with a shifting dark spot on upper part; eyes densely long (♂)- or short (♀)-haired, in male contiguous, interfrontalia linear in front of ocelli, obsolete for a short distance above middle, and forming a rather narrow triangle on anterior half of frons, parafrontalia linear in more than posterior half, rather conspicuously dilated anteriorly, with 3 inclinate setae and, interspersed with them, 2–3 fine rather long setulose hairs on anterior two-fifths, ocellars fine, verticals very thin but rather long and distinct; frons of female one-third head-width at vertex, evenly dilated with almost straight sides to lunula where it is almost one-half (0·45) head-width, frontal triangle with some brownish dust, poorly defined, reaching middle of frons, but its tip narrowly prolonged, fading out near lunula, interfrontalia rather strongly narrowed to lunula, more than four times as wide at middle as a parafrontale, the latter with 4–5 inclinate setae on anterior half and, on outer part, a row of small proclinate black setulae, ocellars and verticals strong; parafacialia as wide, jowls thrice as wide, as third antennal segment, the latter falling short of mouth-margin by almost twice its own width; arista plumose, the rays quickly becoming shorter from middle onwards, longest rays slightly longer than width of third antennal segment. *Thorax* with rather narrow and well defined vittae, the paramedian ones exceeding second *post dc*, outer ones interrupted at suture; setae as in *nemorum* except for position of anterior *ia*; 2+2 *stpl*, anterior lower one fine, hypopleura with only very few inconspicuous small hairs below margin of spiracle. *Abdomen* ovate, in male somewhat truncate at apex, dust rather dense and somewhat silvery; lateral marginals long on anterior segments of male, extending rather far towards middle on second, third with a row of irregular discals and long, rather strong marginals, fourth with a row of long discals and rather long marginals, all setae short and weak in female, lateral marginals moderately strong on anterior three segments, fourth segment with a row of moderately strong discals. *Wings* greyish subhyaline, transverse veins not suffused; r_1 exceeding level of *r-m*, which lies somewhat beyond middle of discal cell, r_{4+5} and *m* diverging at apex, the former very slightly curved backward and sinuous, the latter gently curved backward, *m-m* rather upright and almost straight. Calyptrae whitish subopaque, border yellowish-white, fringe whitish. Halteres reddish-yellow. *Legs:* Fore tibia with 1–2 *p* setae; mid femur with some erect *av* hairs on basal third and 3–4 strong and 1–3 weak *pv* setae

on basal two-fifths, rest of *pv* surface with a fringe of semi-decumbent hairs, which in male are longer than diameter of femur, mid tibia with 3 strong *p* setae; hind femur without *pv* setae, *av* surface in basal half with short irregular (in female rather indistinct) setae, in apical half in male with about 8 long, in female with about 4 shorter strong setae, hind tibia with 2(–4) *ad* and on apical three-fifths 6–7 (♂) or 4–5 (♀) *av* setae, intermediate third or half of *p* surface in male with a row of half-erect *p* setulae.

Length.—6·8–7·7 mm., of wings 6·5–7·7 mm.

Distribution.—N. INDIA (Kashmir: Gulmarg, 8,500 ft.).

Described from the ♂ type and 2 ♀ paratypes in B.M. Malloch placed this species in *Spilaria* mainly because of the setulose ventral edge of the scutellum. The hairs are, however, as in *ANTHOMYIINAE* and not as in *Euspilaria*, and even if allowance is made for transitions between *Euspilaria* and *Helina*, *cashmirensis* can hardly remain in the former.

241. **Helina** (s. str.) **eurymetopa** sp. n.

(Fig. 116)

♂ ♀: Fuscous-black with rather dense pale grey dust, thorax with four narrow incomplete vittae, which are more thinly dusted grey and on most (discal part) of their length overlaid with brown dust, and with an indication of a median vitta extending forward from scutellar suture; abdomen with a pair of round brown-dusted dark spots on posterior three (♂) or intermediate two (♀) segments and sometimes with a narrow irregular median vitta; legs pale ferruginous with piceous tarsi and fuscous coxae, fore femora as a rule largely infuscated, posterior femora sometimes infuscated basally. *Head* rather densely dusted, the dust largely brownish on anterior surface; frons at vertex upwards of a third (0·33–0·37) head-width in male (Fig. 116) and well over a third (0·35–0·39) head-width in female, evenly somewhat dilated with almost straight sides to lunula where it is two-fifths (0·39–0·40) head-width in male and slightly wider (0·43–0·46 head-width) in female, frontal triangle small, but tip narrowly produced and approaching or reaching lunula, interfrontalia markedly narrowed in front, slightly behind, almost or fully four times as wide at middle as a parafrontale, the latter with 3–5 strong and often 1–2 weak inclinate setae on anterior three-fifths and with an irregular row of very small proclinate black setulae on outer part, ocellars and inner verticals strong, outer verticals small in male, moderately strong in female;

parafacialia almost (♂) to fully (♀), jowls twice (♂) to almost thrice (♀), as wide as third antennal segment, the latter falling short of mouth-margin by almost or fully its own width; arista plumose, rays rather quickly becoming shorter in apical third, longest ones near middle of ventral surface and in male almost twice, in female a third again, as long as width of third antennal segment. *Thorax* somewhat dusted brownish on disc, paramedian vittae not reaching middle of *post* part, outer ones very incomplete and broadly interrupted at suture, *prsc* and *pra* small, sometimes indistinct, 2+3 or 2+4 strong *dc*, both *ia* strong; anterior mesopleural distinct, 2+2 *stpl*, hypopleura bare. *Abdomen* with distinct lateral marginals on anterior segments, third in male with a transverse row of erect setulae in the place of the discals, in female with distinct lateral discals, marginal row of third and discal row of fourth segment well developed, marginal row of fourth moderately strong in male, weak in female. *Wings* greyish subhyaline with a brownish tinge, r_1 reaching level of *r-m*, which lies beyond middle of discal cell, r_{4+5} and *m* subparallel near apex, extreme tips slightly diverging, *m-m* rather upright and straight. Calyptrae pale ochraceous-grey with pale ochraceous border and pale golden fringe. Halteres pale reddish-yellow. *Legs:* Mid femur with 1–2 *pv* setae on basal third and a fringe of longer (especially in male) *av* and *pv* hairs on apical half or less, mid tibia with 2–3 *p* setae; hind femur without *pv* setae, with only indistinct or short setae (in female sometimes a stronger one at basal third) on basal half and 3–4 strong ones near apex of *av* surface, hind tibia with 2–3 *ad* and *av* setae and, near basal fourth, a small *pd*.

Length.—5·3–7·4 mm., of wings 5·1–7·4 mm.

Distribution.—N.E. Burma: Kambaiti, 2,000 m, 24.V.34 (*R. Malaise*), ♂ type (in Mus. Stockholm), 28.IV–4.VI.34, 31 ♂, 16 ♀ paratypes (in Mus. Stockholm, Helsinki and B.M.).

242. **Helina** (s. str.) **brunneigena** sp. n.

♂ ♀: Fuscous-black, densely (♀) or rather densely (♂) dusted brown-grey, mesonotum with four fuscous, more (♀) or less (♂) brown-dusted vittae and a median vitta extending from scutellar suture to or beyond transverse suture, disc of scutellum dusted brown, abdomen with a pair of rather large rounded spots on intermediate segments; legs of male piceous with apical three-quarters of hind tibia pale ferruginous, trochanters, femora and tibiae of female pale ferruginous.

Head densely dusted dark brown anteriorly, with the clypeus more pale grey; frons of male as in *pectinifemorata*, but the 8 pairs of inclinate setae rather evenly becoming smaller posteriorly, ocellars very weak, verticals very fine and short but distinctly longer than the occipital setulae; frons of female well over a third (0·35–0·38) head-width at vertex, evenly dilated with almost straight sides to lunula, where it is almost one-half (0·46–0·47) head-width, frontal triangle dusted brown, drawn out (with somewhat concave sides) almost to lunula, interfrontalia markedly narrowed in front, hardly behind, fully four times as wide at middle as a parafrontale, the latter on anterior three-fifths with 3–5 strong inclinate setae and 1–2 small ones between them and a few small proclinate setulae on outer part, ocellars and verticals strong; parafacialia as wide, jowls more than twice as wide, as third antennal segment, the latter falling short of mouth-margin by about its own width; arista plumose, rays becoming slowly shorter in male from middle onwards, in female rather quickly from basal third onwards, longest rays one-eighth longer than width of third antennal segment. *Thorax* with the vittae of the male fuscous and shining but bordered with brown dust, vittae of female rather dull, densely dusted brown, paramedian vittae not quite reaching middle of *post* part, outer ones rather narrowly interrupted at suture; *prsc* rather weak, 2+4 strong *dc*, both *ia* strong, *pra* small; anterior mesopleural well developed, 2+2 *stpl*, hypopleura bare. *Abdomen* with paired round dark spots on first segment, which in male are fuscous and fused with the dark basal colouration, hairs on disc standing on small brown dots which in male are more or less fused, so that the fuscous spots of the intermediate segments are surrounded by a largely brown-dusted area, fourth segment in both sexes with confluent brown spots and dots; anterior segments with strong lateral marginals, in female also with lateral discals, third with a row of strong marginals and more or less interrupted row of discals, fourth with a row of strong discals and, in male strong, in female rather weak, marginals. *Wings* greyish subhyaline with a slight brownish tinge; r_1 slightly exceeding level of *r-m*, which lies well beyond middle of discal cell, both r_{4+5} and *m* gently curved backward, apices very slightly diverging, in male somewhat oblique, slightly sinuous, in female hardly oblique, somewhat concave outwardly. Calyptrae rusty-brown, subopaque, with concolorous border in male, in female ochraceous brown with ochraceous border, fringe golden. Halteres pale reddish-yellow. *Legs:* Fore tibia with a *p* seta; mid femur with the *av* hairs only slightly longer, except near base where

they are erect, but the *pv* hairs in male forming a distinct fringe, basal half in male with 6–7, in female with 4–5 strong erect *pv* setae, mid tibia with 3 strong *p* setae; hind femur without *pv* setae, but in female with 2–3 stronger *pv* setulae near base, *av* row consisting of short setae of somewhat uneven length and ending in 4–5 (♂) or 2–3 (♀) very strong setae on apical third, hind tibia with 3(–4) *ad*, 2–3 *av* and, near base, 1(–2) *pd* setae.

Length.—7·2–9·2 mm., of wings 6·9–8·2 mm.

Distribution.—MALAYA: Gunong Tahan, Pahang, 13.XII.21 (*H. M. Pendlebury*), ♂ type, 1 ♀ paratype (in B.M.); Cameron Highlands, Pahang, 4,500–4,800 ft., 16.V.35 (*H. M Pendlebury*), 1 ♀

The ♀ paratype is the larger specimen. The female from the Cameron Highlands is smaller (wing length 6·7 mm.), its abdomen is mostly destroyed, and the brown dust on the thorax is less extended.

243. **Helina** (s. str.) **argentigena** sp. n.

♂ ♀: Fuscous, densely dusted whitish grey, mesonotum with the paramedian vittae narrow, more or less brown-dusted, and the outer vittae vestigial, intermediate abdominal segments each with a pair of moderately large roundish brown-dusted spots, in male they are slightly oblong and appear fuscous in posterior view, first, and in female also fourth, with a vestige of smaller paired spots, hind margins of abdominal segments pale testaceous translucent, very narrowly so on dorsal surface; trochanters, tibiae and posterior femora pale ferruginous. *Head* densely dusted pale grey, anterior surface in male largely dusted silver-white, interfrontalia fuscous, only very thinly dusted whitish, parafrontalia with a shifting dark spot at level of second antennal segment; eyes of male separated by about one-tenth head-width, frons equally slightly widened to vertex and lunula, interfrontalia band-shaped, twice as much widened to lunula as to vertex, parafrontalia narrow, somewhat widened in anterior third where three moderately strong inclinate setae are present, otherwise quite bare and densely dusted, ocellars long, verticals indistinct; frons of female well over one-third (0·36) head-width at vertex, evenly dilated with slightly concave sides to lunula where it is two-fifths (0·41) head-width, frontal triangle dusted pale grey, narrowly drawn out and fading out towards lunula, interfrontalia somewhat narrowed at lunula, almost

four times as wide at middle as a parafrontale, the latter on anterior half with 5 inclinate setae, which are alternately strong and weak, between them and the anterior reclinate seta with another weak seta, which is bent backward and somewhat inward, and on outer anterior part with 3–4 small proclinate setulae, ocellars and inner verticals strong, outer verticals rather short; parafacialia two-thirds, jowls almost twice, width of third antennal segment, the latter falling short of mouth-margin by its own width (♀) or more (♂); arista densely long-plumose, the rays becoming rather quickly shorter from third fifths onwards, longest rays slightly longer than width of third antennal segment. *Thorax* with very weak *prsc*; both *ia* strong, anterior one in male only slightly in front of level of *sa*, *pra* indistinct or small; anterior mesopleural well developed, 2+2 *stpl*, hypopleura bare. *Abdomen* rather slender, anterior segments with strong lateral marginals, second in male with much weaker marginals completing the row, third with a row of strong marginals and discals, the latter weaker on disc, especially in female, fourth with a row of strong discals and marginals. *Wings* subhyaline with testaceous veins, r_1 somewhat exceeding level of *r-m*, the latter near three-fifths (♂) or at middle (♀) of discal cell, r_{4+5} and *m* gently curved backward and somewhat diverging at tip, *m-m* slightly oblique and almost straight. Calyptrae whitish subopaque (in the female slightly ochraceous suffused) with concolorous border and fringe. Halteres pale yellowish, in the female reddish-yellow. *Legs:* Fore tibia with a *p* seta; mid femur (missing in female paratype) with some erect *av* setulae on basal fourth and 3–4 rather strong *pv* setae on basal two-fifths, mid tibia with 3 *p* setae (always?); hind femur sometimes (in three out of the four male hind femora) with a *pv* seta beyond middle, and in male with 4 rather strong *av* setae on apical half or a little more, the proximal one somewhat smaller and more isolated, in female with 4 *av* on apical third and a weak one at two-fifths, hind tibia beside the *pd* with 3 *ad* and 2 (in female 3) *av* setae.

Length.—5·0–5·6 mm., of wings 4·3–4·5 mm.

Distribution.—INDIA: 15 miles N.E. of Sadiya, Assam, 24.X.43 (*D. E. Hardy*), ♂ type (Mus. Washington), 25 miles S.W of Sadiya, 13.III.44 (*D. E. Hardy*), 1 ♂ paratype (in B.M.); Darjeeling 13–18.IX.13 (*E. Brunetti*), 1 ♀ paratype (in B.M.).

As the female differs in a few minor characters and has been collected at a different place, it may belong to a different species of this difficult group.

244. **Helina** (s. str.) **posteroventralis** sp. n.

♂ ♀ : Fuscous with dense whitish-grey dust, mesonotum with four conspicuous fuscous, more or less brown-dusted vittae and a median one extending forward from scutellar suture to middle of *post* part, the latter vitta suffusedly carried over to disc of scutellum; antennae, palpi, proboscis, and legs piceous to fuscous. *Head* dusted whitish-grey, clypeus and especially parafacialia and parafrontalia silver-white, but appearing dark grey in certain directions; frons at narrowest part (slightly above middle) $\frac{1}{6}-\frac{1}{7}$ head-width, moderately broadened above, rather strongly below, interfrontalia about equally widened to vertex and to lunula, parafrontalia narrow in upper half, moderately dilated in lower half, with 4–6 stronger and weaker inclinate setae on anterior three-fifths, ocellars and verticals moderately strong, very distinct; parafacialia almost as wide, jowls fully twice as wide, as third antennal segment, the latter falling short of mouth-margin by less than its own width; arista plumose, the rays rather quickly becoming shorter from middle onwards, longest rays as long as width of third antennal segment. *Thorax* with moderately narrow vittae, paramedian ones almost reaching level of second *post dc*, outer ones rather narrowly interrupted at suture and fading out towards level of last *post dc*; *prsc* rather weak or very weak, both *ia* very strong, anterior one level with *pra*, which is small but distinct; anterior mesopleural well developed, 2+2 *stpl*, hypopleura bare. *Abdomen* oblong-ovate, apex somewhat truncate in male; intermediate segments each with a roundish somewhat oblong spot dusted fuscous-brown (in posterior view fuscous-black), anterior half of fourth with a narrow brown-dusted median vitta; the base of all setae surrounded by a fuscous dot; setae as in male of *argentigena*; fourth ventrite with numerous half-erect gently curved setulose hairs, forceps as in *appendiculata*. *Wings* greyish subhyaline, r_1 not reaching level of *r-m*, which lies at about three-fifths of discal cell; anterior border of the latter slightly but distinctly concave just before *r-m*, which is markedly oblique; r_{4+5} and *m* gently curved backward, practically parallel near tip, *r-m* very slightly oblique, distinctly concave outwardly. Calyptrae greyish-white subopaque, border somewhat creamy, fringe golden-white. Halteres pale reddish-yellow. *Legs:* Fore tibia with 1–2 *p* setae; mid femur with some erect *av* setulae on basal fourth and 3–5 strong *pv* setae on less than basal half; hind tibia with 3 *ad* and 3–4 *av* setae and about 6 half-erect *p* setulae on intermediate third.

Length.—4·8–6·0 mm., of wings 4·8–5·8 mm.

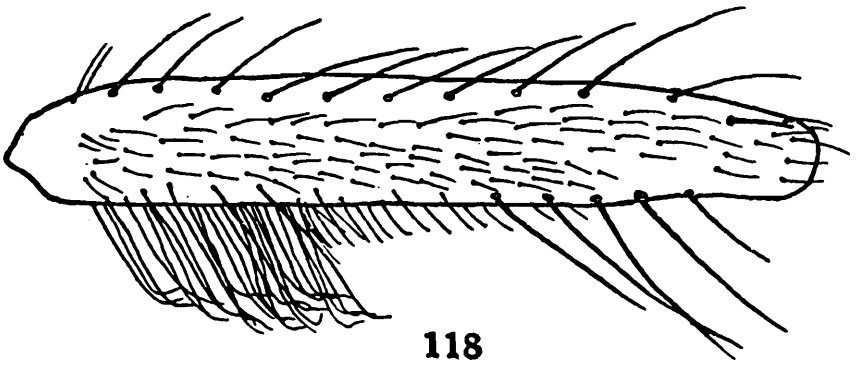
Distribution.—S. INDIA: Kodaikanal, 7,000 ft., 28.III.36 (*B.M.-C.M. Expedition*), ♂ type (in B.M.), 21. and 23.III.36, 2 ♂ paratypes (B.M. and Colombo Museum).

245. **Helina** (s. str.) **pectinifemorata** sp. n.

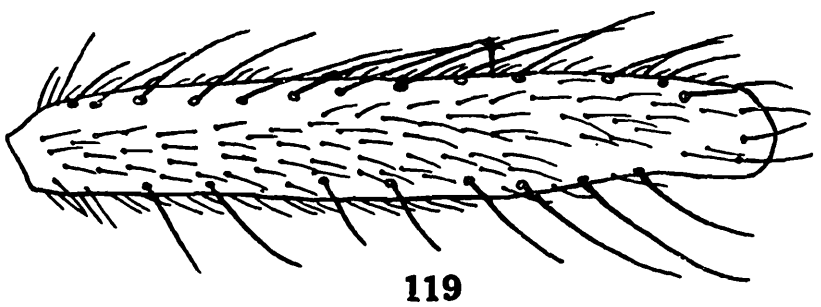
(Fig. 117)

♂ ♀: Fuscous-black with dense cinereous-grey dust, the four thoracic vittae and three (♂) or two (♀) pairs of abdominal spots dusted brown, especially in female; legs piceous, posterior tibiae in female pale ferruginous translucent. *Head* densely dusted pale grey; frons of male about one-tenth head-width near anterior ocellus, strongly dilated to lunula; interfrontalia forming an elongate triangle, the apex of which is somewhat narrowly drawn out to the ocelli and twice as wide as a parafrontale, the latter almost linear in upper half, rather strongly dilated to lunula, anterior three-fifths with 3 strong and, partly alternating with them, 4 small inclinate setae, ocellars rather weak, verticals weak and indistinct; frons of female almost two-fifths (0·38) head-width at vertex, evenly dilated with straight sides to lunula where it is 0·44 times head-width, frontal triangle dusted grey, rather well defined, almost reaching lunula, interfrontalia somewhat narrowed in front, hardly behind, thrice as wide at middle as a parafrontale, with 4–5 strong inclinate setae on anterior half and a sparse row of small proclinate black setulae on outer part, ocellars and inner verticals long and moderately strong, outer verticals moderately long; parafacialia as wide, jowls twice as wide, as third antennal segment, the latter falling short of mouth-margin by half its own width (in ♀; lost in ♂ type); arista plumose, rays rather quickly becoming shorter beyond middle, longest rays an eighth longer than width of third antennal segment. *Thorax* with the paired vittae fuscous, shining and only very thinly overlaid with brown dust in male, but matt and rather densely dusted in female, median vitta in both sexes dusted brown, extending from scutellar suture almost to transverse suture, in type continued on disc of scutellum; *prsc* small, 2+3 strong *dc*, both *ia* strong, *pra* indistinct or small; anterior mesopleural well developed, 2+2 *stpl*, hypopleura bare. *Abdomen* densely dusted, the spots on the second segment of the male oblong, glossy fuscous and, like those on the third segment, only thinly dusted brown, spots and median vitta of fourth

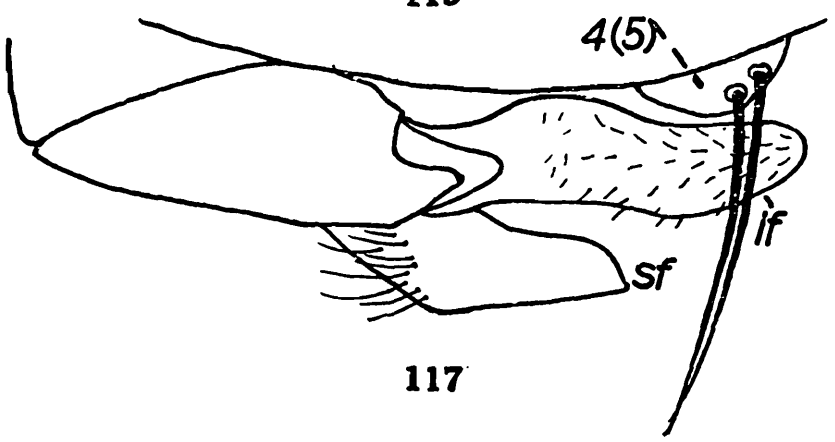
segment more densely dusted brown, the spots on the intermediate segments and the median vitta on basal half of fourth densely dusted brown and matt in female; anterior segments with well developed lateral marginals, in female second also with distinct lateral discals, third with strong lateral discals



118



119



117

FIG. 117. *Helina pectinifemorata* sp. n., male genitalia, lateral view. 4(5), fourth (fifth) ventrite; *if*, inferior forceps; *sf*, superior forceps.

FIG. 118. *Helina hirtifemorata* Mall., left hind femur of male, anterior view.

FIG. 119. *Helina appendiculata* (Stein), left hind femur of male, anterior view.

and a row of strong marginals, fourth with a row of strong discals and in male rather strong, in female very weak, marginals; second genital segment of male elongate, in lateral view triangular, inferior forceps pale testaceous, twice as long as

superior one. *Wings* greyish subhyaline; r_1 not quite reaching level of *r-m*, which lies at almost three-fifths of discal cell, both r_{4+5} and *m* gently curved backwards, tips parallel or slightly diverging, *m-m* slightly oblique and almost straight. Calyptrae whitish subopaque, with slightly yellowish border and whitish fringe. Halteres pale reddish-yellow. *Legs:* Fore tibia with 1(–2) *p* setae; mid femur with the *av* and *pv* rows of hairs somewhat longer, though decumbent, forming a distinct fringe, especially in male, in addition with an erect *pv* seta at base and 2–3 near basal fourth or third; hind femur of male on basal half of *av* surface with a row of fine erect hairs, on apical half with a dense row of 12–15 long fine setae, which are considerably longer than femoral diameter, on basal half of *pv* surface with a very dense multiple row of erect setae, the proximal one being longer, the distal ones slightly shorter than femoral diameter, *v* half of *p* surface otherwise devoid of hairs except for a fringe of setulae on apical sixth, hind femur of female with 0–1 *pv* and 1 *av* seta at basal fifth and 4–5 strong *av* on apical half (the second from base being slightly more *a* in position on both femora), hind tibia with (2–)3 *ad*, 3 rather weak *av*, and, near base, a small *pd* seta.

Length.—5·8–6·2 mm., of wings 5·8–6·5 mm.

Distribution.—S. INDIA: Kodaikanal, 7,000 ft., 23.III.36 (*B.M.-C.M. Exped.*), ♂ type (in B.M.), 24.III.36, 1 ♀ paratype (in Colombo Mus.).

246. **Helina** (s. str.) **infranitens** sp. n.

♂ ♀ : Fuscous with rather dense whitish-grey dust, mesonotum with four conspicuous fuscous vittae, which are somewhat dusted brown, and a similar vitta extending forward from scutellar suture to middle, scutellum with some brown dust at middle of basal part, abdomen with a pair of roundish slightly oblong fuscous spots on anterior three segments, spots thinly dusted brown, and those of first segment broadly fused with the basal dark area, second to fourth segments with a faint brown-dusted median vitta on anterior half; antennae fuscous-brown, palpi and legs piceous, femora and tibiae somewhat brown translucent. *Head* rather densely dusted whitish-grey, parafacialia and parafrontalia densely dusted silver-white, frons about one-tenth (0·9–0·11) head-width above middle, slightly dilated to vertex, rather strongly to lunula, interfrontalia very narrow above middle, forming an elongate triangle to lunula, parafrontalia very narrow in upper half, rather strongly dilated anteriorly, with 7–9

inclinate setae, which alternately are stronger and very weak, on anterior three-fifths, ocellars rather thin but moderately long, verticals very thin but more than twice as long as the adjacent setulae of the occipital row; parafacialia as wide, jowls twice as wide, as third antennal segment, the latter falling short of mouth-margin by about its own width; arista rather densely short-plumose, rays becoming shorter from second fifth onwards, longest ones as long as width of third antennal segment. *Thorax* with rather narrow vittae, paramedian ones reaching second *post dc*, outer ones rather broadly interrupted at suture; *prsc* weak but moderately long, 2+3 strong *post dc* (but possibly variable, *see* below), *ia* strong, anterior one level with *pra*, which is hair-like and indistinct; anterior mesopleural very distinct, 2+2 *stpl*, anterior lower one very weak, hypopleura bare. *Abdomen* oblong-ovate, apex narrowly truncate; the setiferous pores marked by slight spots of brown dust, which may coalesce on fourth segment; setae as in male of *argentigena* but somewhat thinner and, therefore, less regular; hairs of ventrites rather erect, very fine and rather dense, the outer ones more than half as long as height of abdomen, tips very thin and more strongly curved or wavy. *Wings* greyish subhyaline with brown veins, r_1 almost or quite reaching level of *r-m*, which lies almost or quite at three-fifths (in ? ♀ at middle) of discal cell, r_{4+5} and *m* gently curved backward, almost parallel, extreme tips just noticeably diverging; *m-m* almost straight and hardly oblique. Calyptrae whitish subopaque with concolorous border and fringe. Halteres with strongly infuscated knob (but in ? ♀ pale yellow). *Legs:* Fore tibia without a *p* seta; mid femur with some more erect *av* hairs at base and 4–6 *pv* setae in basal half, mid tibia with 2–3(–4) *p* setae; hind femur with the *pv* hairs slightly lengthened, *av* surface with short or indistinct setae on basal half and with 4–5 strong setae in apical half, hind tibia in addition to the small *pd* seta with 3 *ad* and 2 *av* (in ? ♀ 2 *ad* and 3 *av*) setae.

Length.—4·6–(? ♀, 5·7) mm., of wings 4·5–(? ♀, 5·9) mm.

Distribution.—KASHMIR: Killanmarg, 10,500 ft., 15.VII.31 (*J. B. Fletcher*), ♂ type, 1 ♂ paratype, 13.VII.31, 1 ? ♀, to which the greater measurements refer, all specimens in B.M.

The broad glossy piceous-black ventrites of the male are strikingly reminiscent of the European *H. setiventris* Ringd. (whereas *arctata* Collin has narrow glossy ventrites), but the hairing is quite distinct, the ventrites of *setiventris* bearing (normal) more or less decumbent gently and evenly curved setulose hairs with a row of long thin evenly curved setae along side margin. In *setiventris* 4 *post dc* are normally

present, and the halteres are pale yellow. The female collected two days earlier at the typical locality has the characters of *infranitens* but pale yellow halteres and 4 *post dc.* It can hardly belong to one of the other Indian *Helina* studied by me and differs from the female of *setiventris* by conspicuous thoracic vittae (like those of the male of *infranitens*), larger abdominal spots and smaller size. If it is the female of the present form, as seems likely, that might indicate that *infranitens* is a geographical race of *setiventris* rather than a species of its own.

247. **Helina** (s. str.) **hirtifemorata** Malloch.

(Fig. 118)

1926. *Helina hirtifemorata* Mall., *Philipp. J. Sci.*, **XXXI**, 495; 1928, *Ent. Mitt.*, **XVII**, 315. Type: Baguio. In U.S. Nat. Mus.?

Fuscous with rather dense pale grey dust, which becomes more brownish on posterior median part of mesonotum, the latter with four sharply defined and rather narrow fuscous vittae, in male these are overlaid thinly, in female thickly, with brown dust, in addition a brown-dusted median vitta extending forward from scutellar suture and fading out towards transverse suture, also usually continued on basal half of scutellum; anterior three (in female two) abdominal segments with a pair of rounded smallish fuscous spots, which in male are thinly, in female thickly, dusted brown, the first pair fused with the basal dark area; in addition with an incomplete median vitta on anterior part of first three and the whole of the fourth segment; antennae fuscous, palpi and legs piceous, posterior tibiae somewhat brown or pale ferruginous translucent. *Head* rather densely dusted pale grey to cinereous-grey, parafrontalia and parafacialia dusted silver-white; eyes separated by $\frac{1}{12}$–$\frac{1}{15}$ head-width, interfrontalia almost linear in front of anterior ocellus, dilated anteriorly into a moderately broad triangle, parafrontalia linear in posterior half, moderately dilated in front, anterior half or three-fifths with 5–7 inclinate setae, ocellars and verticals fine, the latter not very distinctly differentiated; frons of female two-fifths (0·38–0·42) head-width at vertex, evenly dilated with almost straight sides to lunula, where it is not much less than one-half (0·43–0·47) head-width, frontal triangle densely dusted pale grey, reaching lunula, interfrontalia somewhat narrowed in front, 2–3 times as wide at middle as a parafrontale, the latter on anterior half with 3–4 inclinate setae and on outer part with a row of fine small proclinate setulae,

ocellars and verticals strong; parafacialia almost as wide, jowls twice as wide, as third antennal segment, the latter falling short of mouth-margin by almost its own width; arista rather densely plumose, rays slowly becoming shorter from middle onwards, longest rays about as long as width of third antennal segment. *Thorax* with rather weak *prsc*, 2+4 or 2+3 strong *dc*, 2 strong *ia*, the anterior one level with the small, sometimes indistinct, *pra*; anterior mesopleural rather long, 2+2 *stpl*, hypopleura bare. *Abdomen* oblong-ovate, in male narrowly truncate at tip; anterior segments with well developed lateral marginals, third with several lateral discals and a row of strong marginals, fourth with a row of strong discals and strong (♂) or weak (♀) marginals. *Wings* greyish subhyaline with testaceous veins, r_1 reaching level of *r-m*, which in male lies at or beyond three-fifths, in female well beyond middle, of discal cell, and which is distinctly browned, r_{4+5} and *m* as in *infranitens*, *m-m* hardly oblique, slightly concave outwardly and somewhat browned, lower calyptra subopaque greyish-white with the border slightly yellowish and the fringe whitish. Halteres pale reddish-yellow. *Legs:* Fore tibia without a *p* seta; mid femur with 4–5 strong (in female 3–4 moderately strong) *pv* setae in basal half, mid tibia with 2–3(–4) *p* setae; hind femur of male (Fig. 118) with an *av* row of long setae, the distal 5–6 being markedly strong, a *pv* row of long setulose hairs and the *v* surface between them with numerous long erect fine setulose hairs, the apices of which are slightly wavy, in female *v* and *pv* surface with only short decumbent hairs and *av* surface with 2–3 short setae near base and 3–4 strong ones in apical half, hind tibia in addition to the *pd* seta with 3(–4) *ad*, 3–5 rather small *av* setae, and in male some half-erect *p* setulae on middle third.

Length.—5·6–6·5 mm., of wings 5·6–*c.* 6·5 mm.

Distribution.—PHILIPPINES (Baguio, Luzon). SUMATRA. N. INDIA (Shillong, Assam). S. INDIA (Kodaikanal; Nilgiri Hills).

In the only male from the Nilgiri Hills the eyes are separated by hardly one-ninth head-width. The type has 4 *post dc*, and one of the two otherwise identical males from Shillong has 4, the other 3. A specimen from the type locality is in the B.M. The data concerning the female are based on three specimens with 3 *post dc* from Kodaikanal, but while it is practically certain that these characters will apply to the female of this species, the specimens may quite well belong to *appendiculata*, which also occurs at Kodaikanal, and which I cannot distinguish at present in the female sex.

248. **Helina** (s. str.) **appendiculata** (Stein).

(Fig. 119)

1910. ! *Mydaea appendiculata* Stein, *Ann. Mus. nat. Hungar.*, VIII, 547; 1918, *Ibid.*, XVI, 180. Type: Pattipola. Mus. Budapest.
1918. *Mydaea duplex* (Stein), Stein, *Ann. Mus. nat. Hungar.*, XVI, 180 (nec Stein 1900 ?).
1928. *Helina duplex* (Stein), Mall., *Ent. Mitt.*, XVII, 316; Karl, 1935, *Arb. morph. taxon. Ent.*, II, 41 (nec Stein 1900 ?).

Fuscous, with, especially in female, moderately dense pale grey dust, which is more cinereous on disc of mesonotum; the latter with moderately narrow virtually parallel dark paramedian vittae and broadly interrupted outer vittae, which are thinly overlaid with brown dust, and which are dusted more grey and light brown and are not very conspicuous in female, median vitta as in *hirtifemorata*, but usually absent from scutellum; abdomen, etc., as in that species. *Head* dusted whitish-grey with the parafacialia and parafrontalia more silver-white, especially in male; eyes of male separated by $\frac{1}{10}$–$\frac{1}{15}$ head-width, head and antennae otherwise as in *hirtifemorata*. *Thorax* and *abdomen* as in that species, but the thorax apparently more often with 3 than with 4 *post dc*, and the marginal row of the second and discal row of the third abdominal segment in male more complete, the lateral setae being connected by a row of weak but distinct setae. *Wings*, calyptrae and halteres as in *hirtifemorata*, but *r-m* in male at three-fifths of discal cell or somewhat proximad. *Legs:* Mid femur in male with 3–5 strong *pv* setae; hind femur of male (Fig. 119) without any long *v* and *pv* hairs, only at apex with a short row of longer *pv* setulae, *av* surface with 4–6 strong setae on apical half and with very short half-erect setae or setulae on basal half, everything else as in *hirtifemorata*.

Length.—5·3–5·8 mm., of wings 4·9–5·7 mm.

Distribution.—CEYLON (Pattipola; Nuwara Eliya). S. INDIA (Kodaikanal). N. INDIA (Darjeeling). ? FORMOSA (Stein and Karl as *duplex*). ? SUMATRA (Malloch 1928, as *duplex*).

I have seen a typical pair belonging to the Hungarian National Museum. In the male the 'whitish appendages' mentioned by Stein are visible; they are the pale testaceous inferior forceps. This male has 4 *post dc* but the female only three, the latter figure being given in the description. Males with 3 *post dc* have the inferior forceps of identical shape, but this applies to quite a number of species in this group. The

additional (second) *post dc* of the typical male is weak on one side, and in a female belonging to the Indian Museum it is weak but very distinct on one side and quite indistinct on the other. Specimens with 4 *post dc* cannot be referred to *tibiella* Stein, as this is 7–8 mm. long and has no costal spine.

Very similar to the European *H. duplicata* (Meig.), which will be traced to the present species in the key, but which differs by a short inferior forceps, the presence of an *ad* seta on the mid tibia, etc., and the Ethiopian *quadriseta* (Ad.) (with always only 2 *p* setae on the mid tibia) and *coniformis* (Stein) (with a *p* seta on the front tibia). *H. 'duplicata'* was recorded from FORMOSA (Stein 1915), and this record may concern the present species. Stein (1918), Malloch (1928) and Karl (1935) have apparently synonymized *appendiculata* with *H. duplex* (Stein, 1900) from New Guinea. However, in view of the geographical distance and the number of species now known in this group this synonymy must appear highly doubtful.

249. **Helina** (s. str.) **uliginosa** (Fallén).

1825. *Musca uliginosa* Fln., *Mon. Musc. Suec.*, 81. Types: Sweden. Mus. Stockholm and Lund.
1915. *Mydaea uliginosa* (Fln.), Stein, *Suppl. ent.*, IV, 26; 1918, *Ann. Mus. nat. Hungar.*, XVI, 154.
1922. ! *Helina pellucidiventris* Mall., *Ann. Mus. n. H.* (9), IX, 275. Type: Kasauli. B.M. (n. syn.).

Fuscous, rather densely dusted pale grey, antennae (except for the strongly infuscated apical two-thirds of the third segment), palpi and legs and part of abdomen pale ferruginous, tarsi infuscated, hind femur sometimes browned near apex, abdomen of male infuscated towards apex, of female as a rule largely infuscated except for a pale hind margin to each segment; the four vittae, especially the paramedian ones, distinct and less dusted in front, becoming faint or indistinct towards and behind suture, a pair of fuscous- or brown-dusted paramedian spots extending from suture over a quarter or third of *post* part, sometimes faint or indistinct and sometimes broadened so as to reach first *post dc*, at each side of scutellum (sometimes in Oriental specimens, always in European ones) a similar spot, which extends from base to beyond lateral seta, pores of main setae usually surrounded by some brown dust, and a faint brown spot often indicated to inner side of anterior *ia*; abdomen with a pair of rather large subtriangular trapezoidal spots on intermediate and often small brown-dusted spots on fourth segment, in addition

with an incomplete brown-dusted median vitta on some or all segments. *Head* densely dusted pale golden in front, in female parafacialia with a moderately conspicuous dark shifting spot at level of arista, occiput and jowls dusted pale grey; eyes almost bare, in male separated by $\frac{1}{7}$–$\frac{1}{9}$ (in European specimens $\frac{1}{6}$–$\frac{1}{7}$) head-width, interfrontalia very narrow behind, evenly slightly dilated to lunula, parafrontalia very narrow behind, evenly somewhat dilated in anterior half, with 4–7 inclinate setae, which gradually decrease in length, and between which 2–3 setulae are usually interspersed, ocellars very long, verticals very thin, at least inner ones rather distinct; frons of female one-third head-width at vertex, evenly dilated with almost straight sides to lunula, where it is two-fifths head-width, frontal triangle rather densely dusted brownish-grey, fading out near lunula, interfrontalia somewhat dusted grey, markedly narrowed at extremities, thrice as wide at middle as a parafrontale, the latter on anterior half or three-fifths with 4–5 strong inclinate setae, between which 1–2 small ones may be interspersed, and on outer anterior part with a short row of small proclinate setulae, ocellars and inner verticals very strong, outer verticals moderately strong; parafacialia one-half (♀) to two-thirds (♂), jowls half again (♀) to twice (♂), width of third antennal segment, the latter falling short of mouth-margin by fully (♂) or almost (♀) its own width; arista not very densely plumose, the rays becoming shorter from basal third onwards, longest rays as long to half as long again as width of third antennal segment. *Thorax* with fine *prsc* and small or indistinct *pra*, 1+3 strong *dc*, the anterior *prst* one rather short, and the posterior *prst dc* closer to it than to suture, only slightly behind middle of *prst* part, both *ia* strong, anterior one nearer level of *sa* than of first *post dc*; anterior mesopleural and auxiliary prostigmal well developed, hypopleura bare. *Abdomen* rather slender; first segment with lateral marginals (small in female), second with small lateral discals and strong lateral marginals, third with a row of strong marginals and in male with a row of short erect discals, in female normally with only the lateral discals distinct, fourth with a row of strong discals and marginals (♂) or strong discals and only 1–2 weak marginals (♀). *Wings* greyish subhyaline, veins testaceous, *r-m*, *m-m* and basal node of r_{4+5} browned; r_1 slightly exceeding *r-m*, which lies near three-fifths (♂) or beyond middle (♀) of discal cell, r_{4+5} gently curved backward and slightly diverging at tip; *m-m* hardly oblique and more or less straight. Lower calyptrae greyish-white subopaque with the border somewhat brownish or ochraceous

suffused and the fringe golden-white. Halteres pale reddish-yellow. *Legs:* Mid femur with some erect *av* setulae at base and 3–5 *pv* setae in basal third or half, mid tibia with 2–3 (–4) *p* setae; hind femur with 3–4 strong *av* setae on less than apical half and sometimes in male another 1–2 near middle and 1–2 small *pv* setae, hind tibia with 2(–3) *ad* setae (towards middle and towards apical fourth) and an *av* seta.

Length.—4·8–6·7 mm., of wings 4·6–6·3 mm.

Distribution.—S. INDIA (Nilgiri Hills). N. INDIA (Simla Hills; Kumaon; Mhow; Jhansi; Nepal; Darjeeling; N.E. Bengal; Khasia Hills, Assam). BURMA (Namtu). FORMOSA. PALAEARCTIC and NEARCTIC REGIONS.

In Oriental specimens the fore tibia as a rule lacks the *p* seta, but I have seen a female from Kurseong (E. Himalayas) with a seta on one of the fore tibiae and another from Katihar, Purneah District (N.E. Bengal) with a *p* seta on both fore tibiae. Both do not otherwise differ from Oriental specimens.

250. **Helina** (s. str.) **nervosa** (Stein).

1909. *Mydaea nervosa* Stein, *Tijdschr. Ent.*, **LII**, 240; 1918, *Ann. Mus. nat. Hungar.*, **XVI**, 153, 180; 1920, *Tijdschr. Ent.*, **LXII**, suppl. 69; Mall., 1926, *Philipp. J. Sci.*, **XXXI**, 496. Types: Batavia. Mus. Amsterdam.

1926. *Helina mindanaensis* Mall., *Philipp. J. Sci.*, **XXXI**, 496; 1928, *Ent. Mitt.*, **XVII**, 316. Type: Surigao. Mus. Washington (n. syn.).

Fuscous with rather dense cinereous-grey dust, the four thoracic vittae conspicuous and fuscous anteriorly, especially the paramedian vittae, but faint and light brown at and behind suture, scutellum with slight brown dusting along base, intermediate abdominal segments with a pair of not very large roundish (with a tendency to a subtriangular shape) brown-dusted spots, first sometimes with a pair of small spots, all segments with a faint brown-dusted median vitta on basal part, pores of the setae and hairs lying on brown dots; edges of basal antennal segments pale ferruginous translucent, as are the tibiae, trochanters and, suffusedly, apices of femora, especially posterior ones. *Head* moderately densely dusted brownish-grey, dust on parafacialia and parafrontalia slightly more whitish-grey; eyes thinly short-haired, almost bare, in male contiguous, interfrontalia visible as a moderately broad triangle on less than anterior half of frons, parafrontalia linear in posterior half,

somewhat dilated anteriorly, where 4–6 inclinate setae are present and sometimes 1–2 setulae between them, ocellars very weak, verticals very small but distinct, the adjacent setulae being very short; parafacialia disappearing below middle in profile, two-thirds as wide, jowls less than twice as wide, as third antennal segment, the latter falling short of mouth-margin by almost its own width; arista rather densely long-plumose, rays becoming shorter from middle onwards, longest rays slightly longer than width of third antennal segment. *Thorax* with rather weak *prsc*, *dc* as in *uliginosa*, *ia* not very strong, anterior one sometimes absent, *pra* absent; anterior mesopleural distinct, auxiliary propleural weak, lower anterior *stpl* weak, hypopleura bare. *Abdomen* rather slender, subconical, first segment with only lateral marginals, second with a row of rather strong marginals (sometimes weaker on either side of the paramedian setae) and along base with an irregular single or multiple row of stronger erect setulae, third and fourth segments each with a row of strong discals and marginals. *Wings* greyish subhyaline, slightly yellowish anteriorly near base; r_1 reaching or slightly exceeding level of *r-m*, which lies beyond middle (Sumatran specimen) or near two-thirds of discal cell, r_{4+5} very gently curved backward in apical part, *m* straight, R_5 of practically even width in apical quarter, *m-m* almost straight and hardly oblique. Calyptrae pale ochraceous-grey with concolorous border and pale golden fringe. Halteres reddish-yellow. *Legs:* Fore tibia without a *p* seta (but see below); mid femur with some erect *av* setulae at base and 3–5 erect *pv* setae on less than basal half, mid tibia with 2(–3) *p* setae; hind femur with a few erect *pv* setulae at base and an *av* row of very small widely spaced setae, only 3–4 on fourth and fifth-sixths being strong, hind tibia with 1–2 *ad* setae and 1–2 *av*, the second of the *av* small and situated proximad and close to the stronger one.

Length.—5·2–6·3 mm., of wings 5·4-6·0 mm.

Distribution.—JAVA. SUMATRA. PHILIPPINES (Mindanao). FORMOSA. ASSAM (Chabua, Tinsukia). CEYLON.

The synonymy was considered possible by Malloch, and Stein's description fits perfectly a male from Fort de Kock identified by Malloch as *mindanaensis* and presented to the B.M. by the late E. Jacobson. Moreover, Stein himself identified specimens from this locality as his *nervosa*. Malloch did not mention the female, and I have not seen this sex from the typical countries, but females referred by Stein and myself to the present species have a *p* seta on the fore tibia apart from the normal characters of the female.

251. **Helina** (s. str.) **breviplumosa** sp. n.

♀ : Fuscous-brown, moderately densely dusted pale grey, dust brownish on disc of mesonotum except on a pale grey-dusted vitta enclosing the *dc*, with six fuscous vittae, the normal outer pair being very broad and subdivided by a streak to the inner side of the *prst* and a longer one along the inner side of the *ia*, paramedian vittae narrow and parallel, pleurae suffusedly brown; legs pale ferruginous with piceous tarsi. *Head* moderately densely dusted pale grey, parafacialia with a shifting dark spot at level of second antennal segment; eyes with rather conspicuous short hairs, frons at vertex one-third (0·32) head-width, evenly dilated with straight sides to lunula, where it is two-fifths head-width; frontal triangle thinly dusted brownish-grey, anterior part dully shining, reaching middle of frons, interfrontalia conspicuously narrowed in front, slightly narrowed behind, four times as wide at middle as a parafrontale, the latter with 4 strong and, between or behind them, 1 weak inclinate seta, outer part with a row of thin black proclinate setulae, ocellars and verticals strong; parafacialia two-thirds, jowls half again, width of third antennal segment, the latter falling short of mouth-margin by half its own width; arista short-plumose, including plumosity two-thirds width of third antennal segment, hairs rather numerous, slowly decreasing in length from middle onwards, longest ones fully half as long as width of third antennal segment. *Thorax* with moderately strong *prsc*, 2+4 strong *dc*, 2 strong *ia*, the anterior one slightly nearer level of second than of first *post dc*, slightly behind level of *pra*, which is quite strong; anterior mesopleural conspicuous, auxiliary prostigmal distinct, 2+2 *stpl*, hypopleura bare. *Abdomen* short-ovate with pointed apex, evenly and rather thinly dusted brownish-grey; anterior segments with conspicuous lateral marginals and discals, third with lateral discals and a row of strong marginals, fourth with a row of strong discals and rather weak marginals. *Wings* greyish subhyaline with light brown veins, which become pale testaceous at base; r_1 practically reaching level of *r-m*, which lies at three-fifths of discal cell and is strongly infuscated and somewhat suffused, r_{4+5} and *m* very gently curved back, practically parallel at apex; *m-m* rather strongly concave outwardly, except at extremities, browned and almost unnoticeably suffused. Calyptrae greyish-white, with the margins and border broadly ochraceous suffused, fringe pale golden. Halteres pale reddish-yellow. *Legs:* Tips of the tarsal segments narrowly pale ferruginous; fore tibia without a *p*

seta; mid femur with a row of slightly longer *av* and *pv* hairs, the *pv* ones in almost basal half replaced by 5 strong erect *pv* setae, mid tibia with 3 *p* setae; hind femur on apical third with 4–5 *av* setae, three of which are strong, otherwise without *av* or *pv* setae, apical third of *pv* surface, however, with a fringe of setulae, hind tibia with 2 strong *ad* and 5 *av* setae.

Length.—7·7 mm., of wings 7·5 mm.

Distribution.—N.E. BURMA: Kambaiti, 8,000 ft., 8.V.34 (*R. Malaise*), ♀ type (in Mus. Stockholm).

In general appearance, the short-plumose arista and the rather strong *pra* reminiscent of certain *Phaonia*, but differing by the absence of the *pd* seta of the hind tibia, the presence of the anterior lower *stpl* and infuscated *r-m*, etc.

252. **Helina** (s. str.) **tibiella** (Stein).

1918. ! *Mydaea tibiella* Stein, *Ann. Mus. nat. Hungar.*, **XVI**, 173.
Type: Darjeeling. Mus. Berlin.

Fuscous-black with moderately dense grey dust, mesonotum (now greasy) with four vittae; abdomen with a pair of large almost square somewhat suffused brown-dusted spots on second and third segments, fourth with shifting dark dots which coalesce; posterior tibiae pale ferruginous, except for the infuscated base, on mid tibia apex slightly browned, fore tibia (now missing) with only middle part ferruginous. *Head* (of type stuck on) rather densely dusted pale grey, parafacialia with a shifting dark spot at level of second antennal segment; eyes densely long-haired, frons at vertex one-third (0·32) head-width, moderately dilated with slightly concave sides to lunula, where it is more than two-fifths (0·43) head-width; frontal triangle moderately thinly dusted greyish-brown, drawn out almost to lunula, interfrontalia markedly narrowed anteriorly, slightly so posteriorly, fully four times as wide at middle as a parafrontale, the latter with 4–5 strong setae and, alternating with them, some setulae, outer part with a row of conspicuous proclinate black setulae, ocellars and verticals strong; parafacialia presumably as wide, jowls twice as wide, as third antennal segment, which is missing in type; arista 'moderately long-plumose' (Stein). *Thorax* with moderately strong *prsc* and *pra*, second *npl* somewhat stronger, 2+4 strong *dc*, both *ia* strong, the anterior one slightly nearer level of first than of second *post dc* and about level with the *pra*; anterior mesopleural conspicuous, auxiliary prostigmal indistinct, 2+2 *stpl*, hypopleura bare. *Abdomen* short-ovate with pointed apex; anterior segments with

strong lateral marginals and weak lateral discals, third with rather strong lateral discals and a row of strong marginals, fourth with a row of strong discals and rather weak marginals. *Wings* brownish-grey, moderately subhyaline, with dark brown veins and strongly suffused *r-m* and *m-m*; r_1 somewhat exceeding level of *r-m*, which lies at almost three-fifths of discal cell, r_{4+5} and *m* gently curved back, but the former slightly upcurved at tip, both veins distinctly diverging from *r-m* to tip; *m-m* outwardly concave. Calyptrae ochraceous pale grey with ochraceous border and pale golden fringe. Halteres reddish-yellow. *Legs:* Fore tibia without a submedian seta (Stein; fore legs of type now missing); mid femur with an *av* and *pv* row of long half-erect setulae, the *pv* ones on basal two-fifths replaced by 4 strong erect setae, mid tibia with 2 strong *p* setae; hind femur on apical two-fifths with 4–5 strong *av* setae, otherwise on *av* surface with a row of half-erect setulose hairs, and on *pv* surface with a row of setulae, which are longer and erect on basal two-fifths and become again longer, and also stronger and denser, towards apex, hind tibia with 2 *ad* setae (a short distance on either side of middle) and 5–6 *av* setae (distributed over greater part of length; Stein mentions only three).

Length.—7·0 mm., of wing 7·7 mm.

Distribution.—INDIA: Darjeeling.

Described from the type in the Berlin Museum, the only specimen known at present.

Tribe LIMNOPHORINI

Frons without cruciate interfrontal or proclinate orbital setae. Arista almost bare to plumose, never long-plumose, i.e. rays never markedly longer than diameter of third antennal segment, except in *Spilogona abnormis* and *Graphomyia*. Pteropleura and under side of scutellum (except for black setulae in *L. tonsa* Stein) bare. Metathoracic spiracle without black setulae. Posterior surface of hind coxa without setulae on apical margin. Mid femur without an *a* pre-apical. Hind tibia without a *pd* seta (in Oriental species) and with at most a very small *ad* pre-apical which is not longer than tibial diameter, *pra* absent or small.

The genera *Spilogona* of this tribe and *Helina* of Mydaeini are closely related, and in some cases, especially in the Ethiopian region, the border line is not easily drawn.

Distribution.—The tribe occurs in all regions of the world, and the Lispinae are probably derived from its ancestors. Whilst species with dichoptic males are numerous in the

ORIENTAL REGION and whilst species with 'holoptic' females do occur, the very striking lispoid forms of the ETHIOPIAN REGION have not so far been discovered in the Orient.

Biology.—Some genera (*Gymnodia* and *Anaclysta*) develop in dung and are coprophagous in the second larval stage (the first being spent in the egg) and (probably obligatory) predators in the third. The larvae of *Graphomyia* and many *Limnophora* and *Spilogona* occupy a special niche, as they live among wet vegetation submerged in water or sprayed by waterfalls. Their hind end is pointed and more or less produced dorsally, the posterior spiracles lying at the tip of the process. The third instar is predacious.

Onychomyia Stein (1919, *Arch. Nat.-gesch.*, **LXXXIII**, A 1, 138; 1920, *Tijdschr. Ent.*, **LXII**, suppl. 59) from Java by its bare arista appears to be related to *Gymnodia*, but the characters of the ventrobasal scale, prosternum, etc., are unknown. The frons of the male is broad, the proboscis shining black; there are 1+3 *dc*; R_5 is very narrow at apex; the front and hind tibiae are without submedian setae and the mid tibia with 1 *p*; the claws are long with small pulvilli and a long bristle, which equals the claw.

The descriptions of *Limnophora bengalensis* R.-D. and *macei* R.-D. (1830, *Myod.*, pp. 518 and 519) do not show to which of the genera here accepted they belong, though Oriental species which fit the descriptions are known only in *Gymnodia* and *Limnophora* (both sbg. *Heliographa* and *Limnophora* s. str.). Even less do the descriptions enable the species to be recognized. Prof. Séguy has been good enough to inform me that the two species are not in the Paris Museum, and that the types must definitely be considered lost like the majority of those described in the 'Myodaires' The two forms, therefore, must remain *species dubiae*. The type of *L. Kempi* Brun. in the Indian Museum, Calcutta, proves to be *Paregle cinerella* (Fln.).

A key to the Indo-Australian species of *Limnophora s.l.* was published by Stein (1915, *Suppl. ent.*, **IV**, 37–39); in it five species of sbg. *Heliographa*, of which only two have been found within the limits covered by the present work, are already correctly separated from the rest.

Key to the Genera of LIMNOPHORINI

1 (2) Ventrobasal scale densely hairy (Fig. 123). Hypopleura with conspicuous setulose hairs both on upper anterior embossed part and just below spiracle (Fig. 123).

Arista long-plumose. Lower calyptra of *Musca* type. *prst acr* and anterior and lower *stpl* absent. ♂: Eyes narrowly separated or subcontiguous. *Graphomyia* R.-D., p. 544

2 (1) Ventrobasal scale bare or with a marginal fringe of setulae (Fig. 5). Hypopleura bare.

3 (4) Prosternum setulose along side margins. Base of r_{4+5} with one or several setulae. Ventrobasal scale without a marginal fringe of setulose hairs, *or* apical part of r_1 finely setulose on dorsal surface. *Limnophora* R.-D., p. 554

4 (3) Prosternum bare. r_1 and base or r_{4+5} (in Oriental species) bare.

5 (6) Ventrobasal scale without a marginal fringe of setulose hairs. Arista plumose (in Oriental species), wider than third antennal segment. *m* straight in apical part (in Oriental species)*.. *Spilogona* S. and D., p. 611

6 (5) Ventrobasal scale with a marginal fringe of setulose hairs. Arista virtually bare. *m* markedly upcurved in apical part (very slightly in *G. lasiopa* Emd.).

7 (8) Lower calyptra of *Musca* type, i.e. the inner margin following lateral margin of scutellum, and the apical margin rounded-truncate. Mid tibia with a conspicuous *av* seta beyond middle (Fig. 50). R_5 not much wider at apex than at *r-m* (Fig. 150). *Anaclysta* B. and B., p. 618

8 (7) Lower calyptra of *Phaonia* type, i.e. the inner margin strongly diverging from lateral margin of scutellum from base onwards, and the apical margin strongly rounded. Mid tibia without an *av* seta. R_5 considerably wider at apex than at *r-m*. *Gymnodia* R.-D., p. 621

---

* The genus *Bryantina* Mall. (1926, *Philipp. J. Sci.*, **XXXI**, 506) from Java will probably be traced to *Spilogona* but differs by *m* being broadly curved forward and by a strong *pra*. Only the male is known and it has rather striking characters: only 1 fine *stpl*, first tergite occupying about half the dorsal area of abdomen, second segment of arista six times as long as wide, third widened in middle, long-haired on upper side from near base to apex, on under side only on apical fifth (ex Malloch).

Genus 36. **Graphomyia** Robineau-Desvoidy.

1830. *Graphomyia* R.-D., *Myod.*, 403. Genotype: *Musca* (*maculata* F. =) *maculata* Scop.

Head holoptic in male, dichoptic in female; interfrontalia without cruciate interfrontal setae but richly haired; inclinate setae and ocellars well developed, verticals in male indistinct or absent, in female strong; epistoma rather broad and conspicuous, mouth-margin somewhat produced. Arista long-plumose; third antennal segment elongate. *Thorax* with striking vittae; 0+1 (2) *acr*, 1–2+3–4 *dc*, only 1 *ia*, *pra* distinct, 3 strong postalars, 0+2 (1) *stpl* (in Oriental species), other setae normal; prosternum, propleural depression, pteropleura, suprasquamal ridge and postalar declivity bare, embossed upper anterior part of hypopleura and upper posterior part along spiracle setulose. *Abdomen* with fine hairs, among which somewhat longer and stronger ones are present only at sides and apex; male hypopygium inconspicuous. *Wings* with evenly haired membrane; veins without setulae, except (costa and) base of r_{4+5}; *m* with a broadly rounded but strong bend, apical part somewhat sigmoid. Subcostal sclerite and surfaces of calyptrae without setulae. *Legs* slender; fore tibia without a *p* seta, mid femur without *a* pre-apicals, mid tibia without an *ad* (normally) or *av* seta.

Distribution.—Almost cosmopolitan.

Biology.—The larva of *G. maculata* is found in submerged organic matter in full decomposition (both excrements and decaying leaves); it is predacious in the third instar, feeding on larvae of *Eristalis*, *Ptychoptera*, etc., and provided with paired prolegs on abdominal segments 2–7 (Fig. 9*c*); the slits of the posterior spiracles are recurved at one end, and the pointed tip of the eighth abdominal segment, on which they lie, is kept in contact with the surface of the water (Keilin, 1917, *Parasitol.*, **IX**, 354). The first and second stages are probably scavengers, as Zimin was unable to rear the species beyond the early third instar (1948, *Opred. Faune SSSR.*, **XXVIII**, 70).

The anterior mesopleural does not seem to form a species character in this genus.

Key to the Species of Graphomyia

1 (4) Palpi yellowish-orange. Apex of *m* at least as distant from wing tip as that of r_{4+5}, at, or basad of, apical level of r_{4+5} (Fig. 122).

2 (3) Mesonotum with only three broad black vittae, the median one of even width but much wider than the outer ones (Fig. 120). Eyes almost bare, upper half in male with strongly enlarged widely separated facets. Femora and tibiae pale ferruginous. Posterior three tergites almost wholly dusted yellowish-grey with small paired widely separated dark brown spots. . . . . *adumbrata* (Wied.), p. 546

3 (2) Mesonotum with five narrow black vittae (Fig. 121), the paramedian ones separated from the median one at least in front of suture and terminating near level of second *post dc*, the black pattern therefore much narrower on posterior half of *post* part. Eyes densely hairy, facets in male only slightly larger on upper half. Femora and tibiae brown. Posterior three tergites in posterior view with large undusted areas and more approximated paramedian spots, in addition often a dark spot at hind angles of third and sometimes second. . *atripes* Mall., p. 548

4 (1) Palpi brown to fuscous, sometimes the extreme apex dull reddish. Apex of *m* lying at wing tip or at any rate much closer to it than that of r_{4+5}, lying distinctly distad of apical level of the latter (Fig. 124). Thorax normally with four or five black vittae in front of suture, the inner three very seldom fused to form a broader vitta. Eyes conspicuously or (*rufitibia* ♀) inconspicuously haired, upper facets only slightly larger.

5 (6) Parafrontalia wholly and densely covered with pale dust, the inclinate setae and the hairs therefore all on the pale dusted area, hairs less numerous, in male arranged in a single irregular row; pale dust of parafacialia greyish-white with only a very slight yellowish tinge. Dark pattern less extended (Figs. 124, 125) and more sharply defined, the *prsc* normally contiguous with the pale dusted area at least on outer side. ♂: Interfrontalia normally narrower

at narrowest part of frons than a parafrontale. ♀ : Abdomen in addition to the fuscous-dusted spots with rather inconspicuous not very dark shifting spots. *stipata rufitiba* Stein, p. 550

6 (5) Parafrontalia with more or less conspicuous dark dust along border of interfrontalia, the inclinate setae and at least some of the hairs placed on the dark dusted area, hairs more numerous, in male in a double or triple row; pale dust of parafacialia more or less strongly tinged golden. Dark pattern more extended (Figs. 127, 128) and paramedian vittae of male tending to fuse, the *prsc* as a rule narrowly separated by dark colouration from the pale dusted area. ♂ : Interfrontalia wider at narrowest part of frons than a parafrontale; posterior part of the latter (along ocellar tubercle) wholly dark. ♀ : Abdomen in addition to the fuscous-dusted spots with conspicuous fuscous-black shifting spots.. *maculata* (Scop.), p. 552

253. **Graphomyia adumbrata** (Wiedemann).

(Fig. 120)

1824. *Musca adumbrata* Wied., *Anal. ent.*, 48; 1830, *Aussereur. zweifl. Ins.*, **II**, 413. Type: Java. Mus. Copenhagen.
1909. *Graphomyia adumbrata* (Wied.), Stein, *Ent. Tijdschr.*, **LII**, 205; Mall., 1926, *Treubia*, **VIII**, 340.

Pale ferruginous with the mesonotum largely fuscous and the pleurae partly infuscate; densely dusted pale golden with three broad fuscous-black thoracic vittae and the disc of the scutellum and some abdominal spots dark. *Head* dusted yellowish-grey; eyes in male subcontiguous, on upper half, which is microscopically hairy, with strongly enlarged facets; interfrontalia obliterated, parafrontalia linear, except anteriorly; eyes in female broadly separated. *Thorax* (Fig. 120) with the median vitta parallel-sided, complete, undivided and broader than the outer vittae; scutellum pale ferruginous with a somewhat darker median spot. *Abdomen* (Fig. 120) densely dusted, first segment largely brown, second with a pair of subtriangular dark brown spots, which are not very large, the base of which lies close to hind margin, and the apex of which usually reaches fore margin, and with a small median

spot at base; third segment with a pair of roundish dark spots near hind margin; fourth with or without a pair of faint similar spots near hind margin; second and sometimes third with a similar faint spot on lateral surface near hind margin, and third with a small median spot at base. *Wings* subhyaline with light brown veins; tip of wing about equidistant from apices of r_{4+5} and *m*. Calyptrae pale ochraceous. *Legs* testaceous with strongly infuscate tarsi; mid tibia normally with two small *p* setae; hind tibia with a small *ad* and *av* seta.

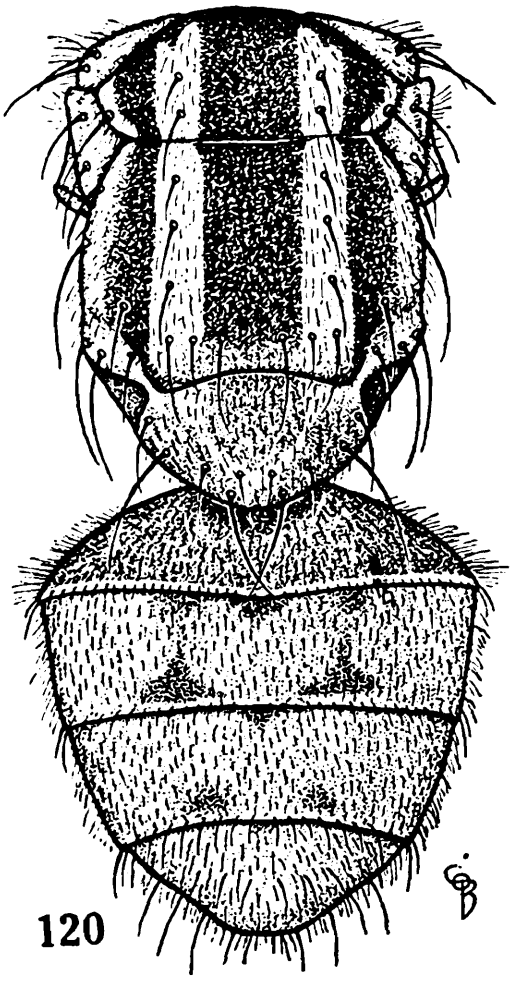


FIG. 120. *Graphomyia adumbrata* (Wied.), thorax and abdomen.

Length.—7–8 mm., of wings *c.* 7 mm.

Distribution.—JAVA (Batavia). SUMATRA. CEYLON (Trincomali).

The Ceylon specimen (in B.M.) is a female without head with very faint brown abdominal spots, the spot on the scutellum darker only by the absence of the pollinosity, and the hair on the anterior three abdominal segments decumbent.

G. vittata Stein (Java) is very similar but has according to Stein a distinctly black median spot on the scutellum, all abdominal spots larger, the abdominal pollinosity more grey, and the legs dark. *G. atripes* Mall. and *mellina* also are closely related, but they have five presutural black vittae, the median one being slightly wider than the paramedian ones, and more hairy eyes.

254. **Graphomyia atripes** Malloch.

(Figs. 121, 122, 123)

1926. *Graphomyia atripes* Mall., *Treubia*, VIII, 340. Type: Wai Lima.

Occiput and thorax fuscous, the latter densely dusted greyish-golden, with 5 piceous-black vittae, the paramedian ones narrow and very narrowly separated from the median one in front of suture, usually fused with it from suture to their hind end; abdomen largely pale ferruginous with brown or piceous spots; base of third antennal segment narrowly reddish-orange, legs dark brown to fuscous, coxae and trochanters partly ferruginous, tarsi piceous-black. *Head* densely dusted pale grey, facial ridges and jowls partly pale ferruginous translucent; eyes in male closely contiguous, interfrontalia visible in anterior two-fifths as a not very broad dull ferruginous triangle, parafrontalia perfectly linear, slightly widened in anterior half where 5–6 mostly fine inclinate setae are present; eyes of female densely short-haired, separated at vertex by 0·31–0·36 times head-width, frons evenly dilated with sides very slightly convex to lunula where it is about two-fifths (0·37–0·44) head-width, interfrontalia black, parallel-sided, half as wide again at middle as a parafrontale, frontal triangle with rather dense pale grey or brownish dust, reaching lunula, parafrontalia evenly dusted whitish-grey, with 6–7 inclinate setae and numerous fine dark proclinate hairs. *Thorax* (Fig. 121) with the dark vittae fused on neck declivity, the median vitta posteriorly about as wide as the outer one, which almost reaches level of last *dc*, behind suture a 6th and 7th vitta normally present on lateral declivity and running through the pores of the *sa*; scutellum largely covered by a dark basal discal spot and a lateral spot which reaches the lateral seta and which is often fused along base with the discal spot; 2+4 strong *dc*. *Abdomen* (Fig. 121) testaceous to pale ferruginous, golden dust in posterior view confined to incisures, basal part of lateral surface of each segment, a triangular or trapezoidal median spot (tapering

posteriorly), on which the elongate-triangular dark median spot is placed, and some dots on posterior two segments, these dots more or less confluent on fourth segment; intermediate segments at hind margin on each side of middle with a brown to piceous-black roundish spot and often another dark spot at each hind angle, fourth segment with or without a pair of elongate fusiform dark spots on disc in addition to the wedge-shaped median spot. *Wings* (Fig. 122) subhyaline

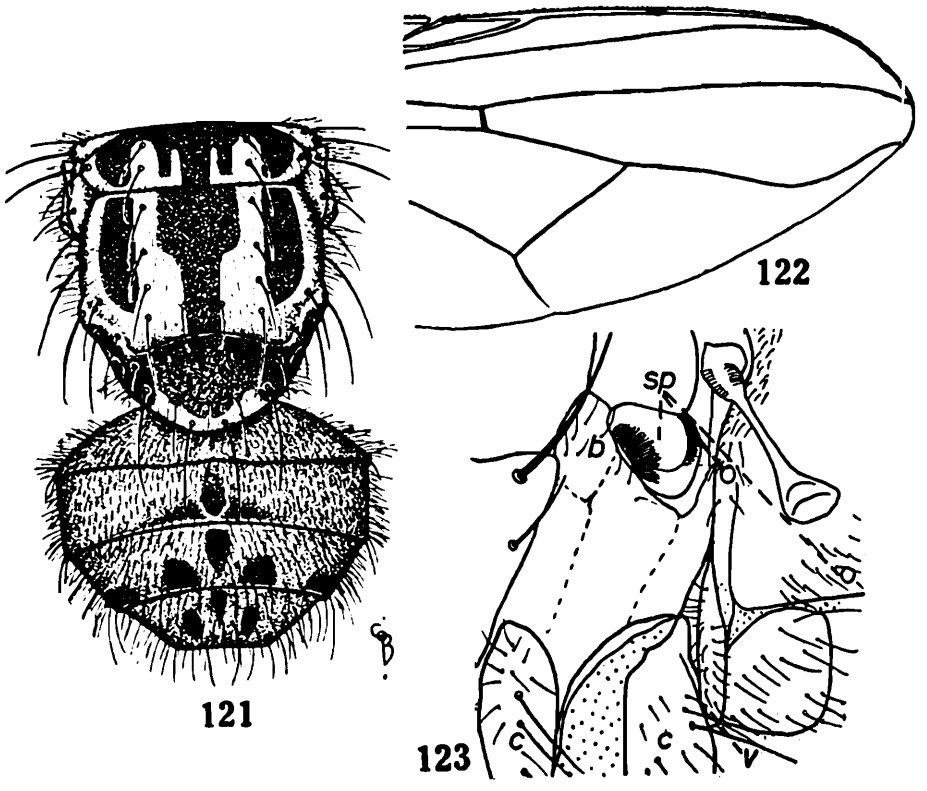


FIG. 121. *Graphomyia atripes* Mall., thorax and abdomen.

FIG. 122. *Graphomyia atripes* Mall., apical part of wing.

FIG. 123. *Graphomyia atripes* Mall., hypopleura, base of abdomen, etc.; *b*, embossed upper anterior part of hypopleura; *c*, coxa; *sp*, spiracles; *v*, ventro-basal scale.

with brown veins. Calyptrae pale brownish with concolorous border and golden, in Ceylon specimens brown, fringe. *Legs* often somewhat reddish-brown at the knees; mid tibia with 1 *p* and 1 *pd* seta, sometimes also with a small *ad*; hind femur with a widely spaced row of rather strong *av* setae and on basal half 2–5 fine but long *pv* setae, hind tibia with 1 *ad* and 1 *av* seta.

Length.—5·5–8 mm., of wings 6·0–7·0 ? mm.

Distribution.—SUMATRA (Wai Lima, S. Sumatra; Kajoe-Tanan). BORNEO (Bettotan nr. Sandakan). CEYLON (Kandy; Haragama).

The largest specimen I have seen measures only 6·3 mm. with a wing-length of 7·0 mm. The male type, however, is 8 mm. long, according to Malloch. Of the measurements of the female frons the smaller ones are those of a specimen from Ceylon, the larger ones those of the female from Kajoe-Tanan. The difference is rather substantial, and it is possible that more material would cause the Ceylon form to be considered as a subspecies.

255. **Graphomyia stipata rufitibia** Stein.

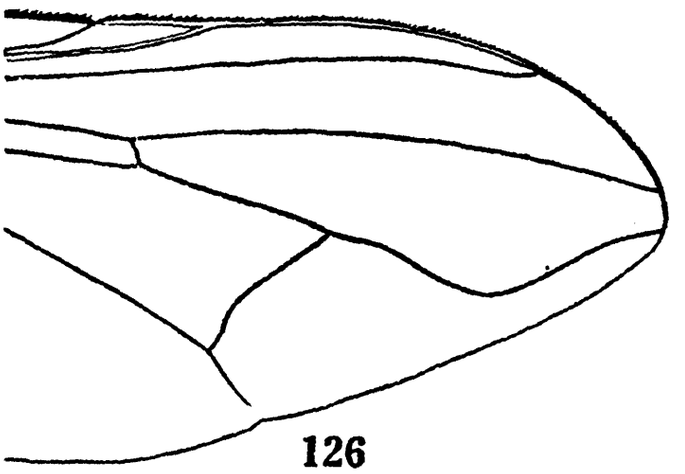
(Figs. 124, 125, 126)

1918. *Graphomyia rufitibia* Stein, *Ann. Mus. nat. Hungar.*, **XVI**, 147; Karl, 1935, *Arb. morph. taxon. Ent.*, **II**, 37. Types: Formosa (Kosempo; Koshun; Polisha; Takao; Kuschirei). Mus. Budapest.

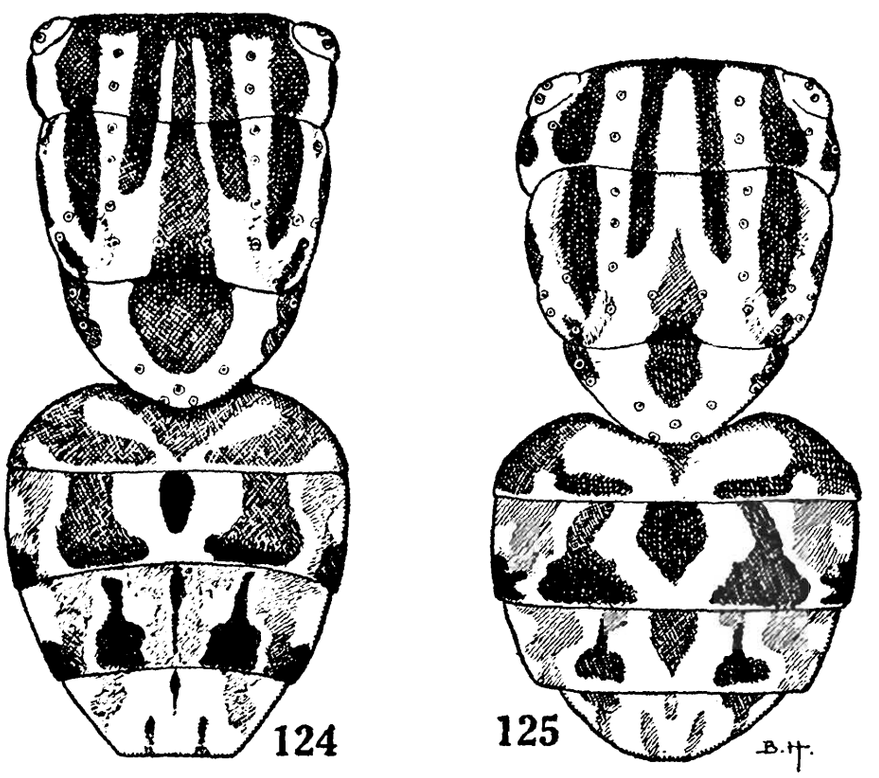
1926. *Graphomyia vittata* Stein of Malloch (nec Stein), *Treubia*, **VIII**, 340; 1928, *Ent. Mitt.*, **XVII**, 331.

Fuscous-black with dense whitish-grey dust and black pattern, the male with the abdomen largely testaceous. *Head* in male with the eyes densely long-haired, separated by one-ninth head-width, frons and face moderately dilated, so that the eyes are separated at lower extremity by not much more than five times that distance; interfrontalia black, parafrontalia wholly dusted silver-grey with only one dense row of erect inclinate setulae close to the frontal setae; in female eyes with short and moderately dense hairs, separated at vertex by almost three-tenths (0·28–0·29) and at lower extremity by over one-half (0·55) head-width, interfrontalia almost parallel-sided, black with frontal triangle dusted whitish-grey and somewhat dusted brown near ocelli, reaching lunula as a narrow band, less than twice as wide as a parafrontale, the latter evenly dusted whitish-grey, somewhat broadened from hind to fore end. *Thorax* (Figs. 124, 125) with a pair of conspicuous, slightly diverging paramedian vittae from neck to beyond level of second *post dc*, a pair of somewhat broader vittae outward to the *dc* from neck to last *dc*, very narrowly interrupted by the suture, and a wedge-shaped median vitta from hind margin forward, becoming very narrow to obsolescent in front of suture in male and more or less obsolete from level of first *post dc* onward in female; on the scutellum this median vitta forms a large central basal spot, which in male occupies about half, in female a third, width of scutellum, and the apex of which seldom exceeds level of discal setae, base of lateral surface of scutellum with a small black

spot. *Abdomen* (Figs. 124, 125) in male dull testaceous translucent, in female dark grey, with dense whitish-grey pollinosity; with shifting whitish-grey and grey spots, in addition each segment with an elongate fuscous-black median spot, which does not reach hind margin and which on the fourth segment is often brown and faint, and a spot of similar



126



124 125

FIG. 124. *Graphomyia stipata rufitibia* Stein, thorax and abdomen of male.

FIG. 125. *Graphomyia stipata rufitibia* Stein, thorax and abdomen of female.

FIG. 126. *Graphomyia stipata rufitibia* Stein, apical part of wing.

colouration along middle of each lateral half of intermediate segments and becoming narrower or obsolete towards front margin; on the first segment this spot forms an arched transverse band from anterior part of lateral margin to near middle of hind margin. *Wings* subhyaline with light brown veins; calyptrae greyish-white. *Legs:* Fuscous with the knees and tibiae pale reddish-brown.

Length.—6·0–7·0 mm., of wings 6·4–7·0 mm.

Distribution.—CEYLON. INDIA (Bombay; Bengal). BURMA (Minbu Dist.). FORMOSA (Specimens named by Stein from Takao and Koshun in B.M.). CHINA (Tsingtau). JAVA. SUMATRA. PALAU IS. Type form in the NEOTROPIC REGION.

Malloch's remarks on '*G. vittata Stein*' refer clearly to this species, and Sumatran specimens named by him and presented by E. Jacobson to the B.M. confirm this. The real *G. vittata* Stein is related to *adumbrata* (q.v.). Single specimens of *stipata* may not always be easily separated from *maculata*, but the distribution seems to indicate that both are good species.

Specimens from Mexico, British Guiana, Colombia and the Argentine do not differ from Oriental ones except by markedly shorter and weaker *av* and *pv* setae or hairs of the hind femur, so that *rufitibia* cannot be regarded as more than a subspecies of *stipata* Walk. (1856, *Dipt. Saund.* p. 348. Type: Demerara. In B.M.).

256. **Graphomyia maculata** (Scopoli).

(Figs. 127, 128)

1763. *Musca maculata* Scop., *Ent. Carn.*, 326. Types: Carniolia. Lost.

1935. *Graphomyia maculata* (Scop.), Karl, *Arb. morph. taxon. Ent.*, II, 37.

Fuscous-black with dense whitish-grey or yellowish-grey dust and a broad black pattern, male with largely testaceous abdomen. *Head* with densely long-haired, in female moderately long-haired, eyes, which in male are separated at narrowest part by 0·04–0·09 times head-width, and at lower extremity by 1–9 times that distance; in female separated at vertex by one-fourth to three-tenths head-width, at lower extremity by almost three-fifths head-width, interfrontalia rather strongly broadened from vertex to lunula, two-and-a-half times as wide at middle as a parafrontale, frontal triangle less conspicuous than in *rufitibia*; inner part of parafrontalia (♂ ♀) more or less dusted fuscous with several dense rows of

inclinate setulae close to the frontal setae. *Thorax* (Figs. 127, 128) with the median vitta dusted brownish anteriorly and the paramedian dark vittae in male usually fused behind (rarely also in front of) suture with each other, the black median vitta broader near scutellum and more distinctly extended forward; median spot of scutellum never occupying much less than half its basal width, in male almost or quite fused at base with the lateral spots, its apex exceeding level of discal setae. *Abdomen* (Figs. 127, 128) much as in *rufitibia*,

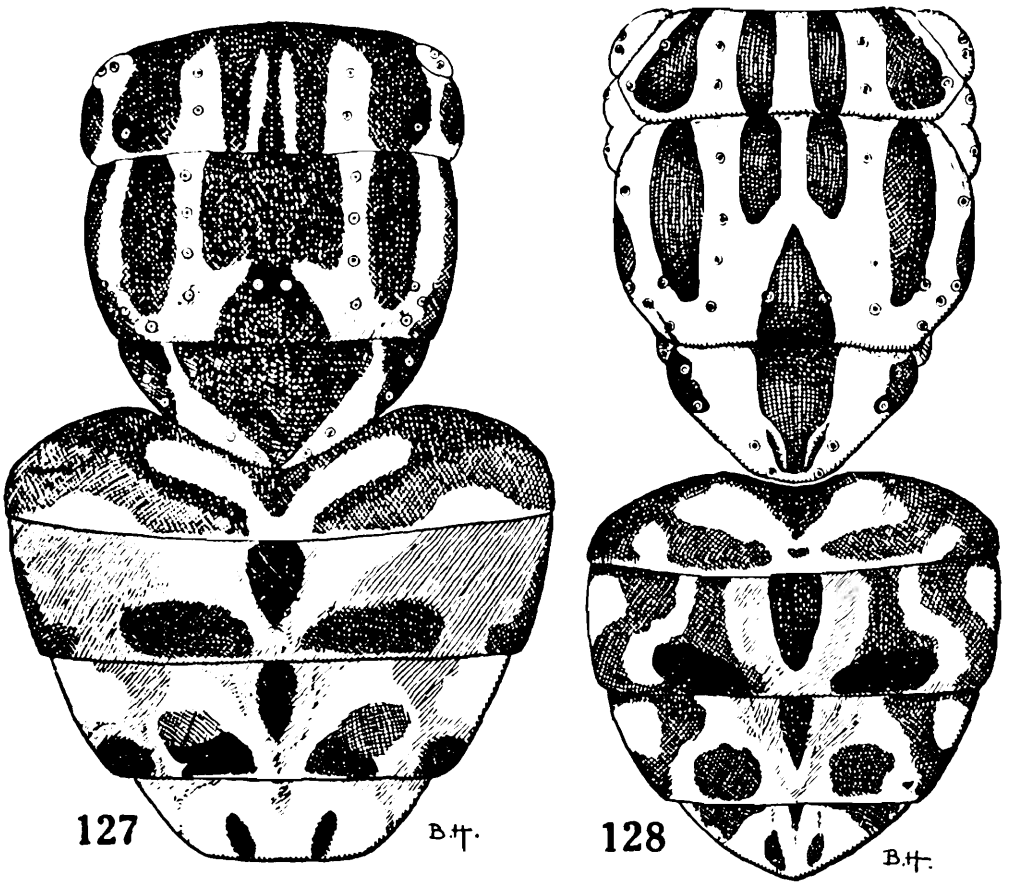


FIG. 127. *Graphomyia maculata* (Scop.), thorax and abdomen of male.
FIG. 128. *Graphomyia maculata* (Scop.), thorax and abdomen of female.

but the median spots usually reaching further towards hind margins, the fourth segment with conspicuous oblong-ovate fuscous paramedian spots, the dark spots at middle of each lateral half of the intermediate segments in male restricted to posterior half and on second segment sometimes obsolete. *Wings* as in *rufitibia*; lower calyptra markedly greyish-brown in male and slightly browned in female. *Legs* fuscous with the tibiae brown to reddish-brown.

Length.—7·1–9·2 mm., of wings 6·9–9·4 mm.

Distribution.—CEYLON. KASHMIR (Gulmarg; Dal Lake). INDIA (U.P., Mussoorie). N.E. BURMA (Kambaiti). OKINAWA. FORMOSA. PHILIPPINE IS. PALAEARCTIC, NEARCTIC and NEOTROPIC (?) REGIONS, a subspecies in the ETHIOPIAN REGION, where the typical form has also been found in the GOLD COAST.

I have seen only one male specimen (but many females) from the Oriental region (Mussoorie) apart from the Kashmir males, and this has a markedly narrower frons (0·04 times head-width) than specimens from Kashmir and Europe.

Genus 37. **Limnophora** Robineau-Desvoidy.

1830. *Limnophora* R.-D., *Myodaires*, 517. Genotype, *L. palustris* R.-D.

1866. *Melanochelia* Rond., *Atti Soc. ital. Sci. nat. Milano*, **IX**, 136. Genotype, *Aricia* (*surda* Zett. of Rond. nec Zett. =) *exsurda* Pand.

1893. *Pseudolimnophora* Strobl, *Verh. zool. bot. Ges. Wien.*, **XLIII**, 272. Genotype, *Musca triangula* Fln.

1893. *Stroblia* Pok., *Verh. zool.-bot. Ges. Wien.*, **XLIII**, 541. Genotype, *Musca triangula* Fln.

1893. *Calliophrys* Kow., *Wien. ent. Z.*, **XII**, 49. Genotype, *Musca riparia* Fln.

1921. Sbg. *Heliographa* Mall., *Ann. Mag. n. H.* (9), **VII**, 169; 1922, l.c. (9), **X**, 574 (*Myiographa* err. typogr.); 1925, *Philipp. J. Sci.*, **XXVI**, 508; 1929, *J. Fed. Malay S. Mus.*, **XIV**, 453. Genotype, *L. tonsa* Stein.

1928. *Limnina* Mall., *Proc. Linn. Soc. N.S. Wales*, **LIII**, 327. Genotype, *L. elongata* Mall.

1928. *Limnella* Mall., *Proc. Linn. Soc. N.S. Wales*, **LIII**, 328. Genotype, *L. orthoneura* Mall.

Head with eyes contiguous to broadly separated in male, narrowly to broadly separated in female, where proclinate orbital and cruciate interfrontal setae are absent; if reclinate orbitals are present in female, the anterior one the weaker; parafacialia bare; arista practically bare to plumose, never long-plumose; palpi not or slightly dilated at tip. *Thorax* largely dark or with an *Anthomyia* pattern or with a pattern which contains a median vitta, seldom in Oriental species (*albitarsis* Stein) with an even number of vittae; *acr* hair-like except often for the *prsc*, *pra* absent or small; prosternum more or less broadened anteriorly, its lateral margins with black setulae. *Abdomen* as a rule with paired subtriangular spots on intermediate segments. *Wings* with setulae on dorsal and ventral surfaces of base of r_{4+5}; *sc* sinuate between the part farthest from *c* and the bend towards *c*; *m-m* normally more or less straight and upright. Halteres more or

less yellowish in Oriental species. *Legs:* Mid femur without an *a* pre-apical, but with 1 or 2 *pd* pre-apicals; mid tibia without an *av*, *pv*, and, in Oriental species, *ad* seta; hind tibia without a *pd* seta between middle and apical sixth.

It is not possible in dealing with the Oriental forms, to maintain the subgenera *Pseudolimnophora* and *Calliophrys*, which are generally accepted for the European fauna. This applies especially to the females.

Distribution.—All regions of the world, not found in NEW ZEALAND.

Biology.—In humid places, especially in the vicinity of streams (e.g. *himalayensis*), the larvae of some species being aquatic like those of *Graphomyia*, whilst others develop in dung (e.g. the Mediterranean-Ethiopian *L. notabilis* Stein). In some species the larva hatching from the egg appears to be in the third stage (Keilin, 1917, *Parasitol.*, **IX**, 353).

Key to the Species of Limnophora

1 (52) r_1 wholly bare on dorsal surface. (Sbg. *Limnophora* s. str.).

2 (33) 3 *post dc.* Mid tibia normally with only 1 *p* seta, which lies at, or basad of, middle, seldom a second seta present near apical quarter.

3 (10) Arista, including plumosity, almost or fully as wide as third antennal segment. ♂ : Frons less than one-sixth head-width.

4 (5) Dorsal surface largely glossy black with very thin brown dust, pale dust silver-white, on abdomen (Fig. 129) restricted to antero-lateral parts of first, second and fourth segments, on mesonotum to shoulder region, lateral part of suture and declivity in front of scutellum. *m* virtually straight. Hind femur only with 1–2 *av* setae towards apex. . . . *albonigra* sp. n., p. 562

5 (4) Dorsal surface more densely dusted, matt, the pale dust grey, third abdominal segment as conspicuously pale dusted on antero-lateral part as second and fourth (Fig. 130), the pale dusted area more densely dusted and larger. *m* slightly or markedly upcurved at apex.

6 (7) Fourth tergite with a pair of oblong dark spots which are separated by a densely grey-dusted median vitta (Fig. 130). Mesonotum (Fig.

130) with a pair of dark subtriangular *prst* spots from neck to second *prst dc* and *prst* and a median vitta, which extends from the *post* band to neck, gradually tapering; apical half of scutellum dusted pale. *m* slightly upcurved. Hind femur with 3 *av* setae near apex. . . . *geminimaculata* sp. n., p. 564

7 (6) Fourth tergite with or without a dark median spot but not with a paired spot. Mesonotum without well defined paired *prst* spots, the disc more or less evenly fuscous-brown, shoulders and lateral parts of suture dusted pale grey, sometimes with an indication of a pair of linear paler dusted paramedian vittae or with very suffused dark spots, in the latter case *m* markedly upcurved at apex.

8 (9) *m* very slightly and evenly upcurved, apical width of R_5 four-fifths to nine-tenths (0·79–0·89) of greatest width. Longest rays of arista half as long as width of third antennal segment. ♂ : Abdomen (Fig. 131) ovate, third segment more than twice as wide behind as long, triangular paired spots of intermediate segments much wider than long. ♀ : pattern of mesonotum well defined, densely dusted brown. *mallochi*, sp. n., p. 566

9 (8) *m* markedly and more suddenly upcurved (Pl. 2, fig. 14), apical width of R_5 two-thirds to three-fourths (0·67–0·74) of greatest width, seldom reaching or exceeding four-fifths of that width. Longest hairs of arista more than half as long as width of third antennal segment. ♂ : Abdomen (Fig. 132) elongate-ovate, third segment less than twice as wide behind as long, triangular paired spots of intermediate segments longer than wide. ♀ : Pattern of mesonotum suffused and more or less reduced. *latiseta* sp. n., p. 568

10 (3) Arista not or hardly more than half as wide, including plumosity, as third antennal segment, except in males with a frons of two-fifths head-width (*subplumosa*), in which it may be two-thirds width of third antennal segment.

11 (16) Dark spot on fourth tergite divided into two elongate spots by a densely grey-dusted median vitta (*see* Fig. 130).

12 (13) Mid femur with only 1 *p* pre-apical. Mesonotum with 2 or 4 brown vittae, a narrow median vitta remaining grey-dusted. Parafacialia linear near middle. Small species (2–2·5 mm.). ♂ : Frons about one-third head-width; basal two segments of mid-tarsi white, the others black and conspicuously widened.. .. *albitarsis* Stein, p. 570

13 (12) Mid femur with 2 *p* pre-apicals.

14 (15) Mesonotum wholly dusted grey in front of suture with only an inconspicuous narrow median streak of brownish dust extending forward for a short distance. Parafacialia linear near middle. Small species (3 mm.). ♂ : Frons more than one-fifth head-width.. *angustatifrons* sp. n., p. 571

15 (14) Mesonotum with 3 broad brown vittae or almost wholly dusted brown, always dark on median line (*i.e.* if grey vittae are present they are paired, paramedian). Parafacialia more than half as wide as third antennal segment. Medium-sized species (4–5·6 mm.). ♂ : Frons $\frac{1}{7}$–$\frac{1}{10}$ head-width. ... *fallax* Stein, p. 573

16 (11) Fourth tergite with an undivided dark median spot or unspotted. Mid femur with 2 *p* pre-apicals. Thorax never with 2 or 4 vittae. ♂ : Frons at least one-fifth head-width, except in *prominens*.

17 (18) Frons at narrowest part not or hardly wider than third antennal segment. Hind tibia with an *av* seta. *prst acr* arranged in about four longitudinal rows. *prominens* Stein, ♂, p. 574

18 (17) Frons at narrowest part at least one-fifth head-width.

19 (20) Jowls less than half as wide as third antennal segment; parafacialia linear at middle (Fig. 133). Shoulder region and pleurae densely dusted greenish-grey. *prst acr* in only 2 longitudinal rows, which are much less widely separated from each other than from the *dc*. Face in profile at most as long as frons; longest hairs of arista about as long as its basal width.

Apical section of *m* almost straight. ♂ : Frons half as long again as wide, less than one-third (0·30) head-width, 3–3·5 mm.. *angustibucca* sp. n., p. 576

20 (19) Jowls more than half as wide as third antennal segment (Fig. 134). Shoulder region, etc., with greyish but not with greenish dust.

21 (24) Head at vibrissa conspicuously longer than at anterior extremity of frons (Fig. 134).

22 (23) Hind tibia without an *av* seta. Parafrontalia dusted whitish-grey, interfrontalia fuscous, appearing whitish in anterior view. Parafacialia a third width of third antennal segment. ♂ : Frons about one-fourth head-width.. .. *pendleburyi* sp. n., p. 578

23 (22) Hind tibia with an *av* seta. Parafrontalia dusted brown, interfrontalia dark brown, somewhat velvety. Mesonotum densely dusted greyish-brown, often with a pair of narrow grey or brownish-grey paramedian vittae. ♂ : Frons two-fifths head-width; parafacialia linear near middle. . *brunnescens* sp. n., p. 580

24 (21) Head at vibrissa not markedly longer than at anterior extremity of frons. (♀ ♀ largely inseparable at present, *see* pp. 576 and 589).

25 (26) Parafacialia linear below middle (Fig. 135); face longer than frons in profile; frons wider than long, almost one-half head-width; frontal triangle reaching lunula. Longest hairs of arista almost twice as long as its basal width. Apical section of *m* practically straight. Disc of mesonotum largely fuscous..... . *breviceps* sp. n., p. 582

26 (25) Parafacialia below middle more than a third width of third antennal segment. ♂ : Frons at vertex two-fifths (0·37–0·41) head-width.

27 (28) Interfrontalia in most views conspicuously dusted whitish, more strongly so in male, but fuscous-black in a postero-dorsal view, parafrontalia and parafacialia densely dusted whitish. Abdominal segments (Fig. 136) moderately short, the triangular paired spots especially distinct close to the pale dusted median vitta, therefore usually appearing elon-

gate. Longest hairs of arista hardly longer than its basal diameter. ♂: Face narrowest at middle, as a rule broadened both to lunula and vibrissae. . . .. *argentata* sp. n., p. 583

28 (27) At least interfrontalia, often also parafrontalia, largely dusted brownish.

29 (30) Parafrontalia dusted silver-grey. Arista, including plumosity, two-thirds width of third antennal segment. Fourth abdominal segment with or without an oblong median spot extending to about basal half of segment. ♂: Tergites (Fig. 137) very short, paired triangular spots strongly transverse; wings not darkened. *subplumosa* sp. n., p. 585

30 (29) Parafrontalia dusted brown.

31 (32) Arista, including plumosity, about a quarter width of third antennal segment. Fourth abdominal segment with a large median triangular spot, the apex of which lies at the base of the segment. ♂: tergites (Fig. 138) moderately short, paired triangular spots less transverse; wings somewhat smoky. . .. ... *pubiseta* sp. n., p. 587

32 (31) Arista, including plumosity, slightly more than half as wide as third antennal segment. Fourth abdominal segment with a large median spot which is widest at middle of length. ♂: Tergites not very short; paired triangular spots strongly transverse (*'fasciformes'*) wings infuscated. *tinctipennis* Stein, p. 588

33 (2) 4 *post dc.*

34 (47) Mid tibia with 2 *p* setae.

35 (38) Arista plumose, almost or fully as wide, including plumosity, as third antennal segment. Fourth tergite with an incomplete dark median vitta.

36 (37) *m* hardly upcurved and not at all sinuous at apex. Scutellum wholly dusted brown, thoracic pattern rather suffused, consisting of a pair of dark *prst* spots and a *post* band which almost reaches the last *dc*. Lower *stpl* small but very distinct. ♂: Frons one-third head-width; base of fore femur with some long bristles which are curved towards its apex; fourth ventrite (Fig. 139) scoop-like, large, convex and shining piceous in

posterior half, covered with dense short decumbent hairs, hind margin convex with a dense fringe of light brown hairs. ♀: Frontal triangle slightly shining, evenly covered with thin brown dust. *plumiseta* Stein, p. 589

37 (36) *m* markedly (though not strongly) upcurved, somewhat sinuous at apex. Apical part of scutellum dusted pale grey, thoracic pattern clearly defined, similar but somewhat less extended than in *plumiseta*. Lower *stpl* more or less indistinct. ♂: Frons not much wider than third antennal segment; fourth ventrite (Fig. 140) broadly excised at apex. ♀: Frontal triangle densely dusted pale grey except for apical third, therefore appearing truncate and contrasting with interfrontalia and apical part. *himalayensis* Brun., p. 591

38 (35) Arista short-haired, less than a third width of third antennal segment.

39 (40) 2–3 mm. long. *prst acr* in only 2 rows with one or two hairs between the rows towards suture. Frons (♂ ♀) at narrowest part about two-fifths head-width.. *malaisei* sp. n., p. 593

40 (39) More than 3 mm. long. Frons, at narrowest part, up to about a quarter head-width, except in female of *glaucescens*, where it approaches two-fifths head-width.

41 (42) Mid femur at most (♂) with a fringe of thin curved setae on *v* surfaces. Setulae on r_{4+5} normally extending more than halfway to *r-m*. Mouth-margin more projecting than anterior part of frons. *acr* in only 2 rows from neck to about second *post dc*, these rows half as widely separated from each other as from the *dc*. *m* practically straight in apical sector (Pl. 2, fig. 13). ♂: Frons $\frac{1}{7}-\frac{1}{8}$ head-width. ♀: Frons more than one-third head-width.. ... *glaucescens* sp. n., p. 594

42 (41) Mid femur with one or more strong erect setae on *v* surfaces. Setulae on r_{4+5} not extending much beyond node. Mouth-margin not more projecting than frons. Frons less than three-tenths head-width (♂ ♀).

43 (46) At level of anterior ocellus 1–2 small reclinate setae. Fore tibia without a *p* seta. Frons (♂ ♀) at least about one-eighth head-width.

44 (45) ♀ : Frons $\frac{1}{6}$ to $\frac{1}{5}$ head-width (Fig. 141); hind femur with a complete row of rather widely spaced *av* setae. *perakensis* Mall., p. 596

45 (44) ♂ ♀ : Frons a quarter to three-tenths head-width (Fig. 142); hind femur with 2–3 *av* setae near apex only. . . . . *apiciseta* sp. n., p. 598

46 (43) At level of anterior ocellus a small proclinate setula. Hind femur with a complete series of rather widely spaced *av* setae. ♀ : Fore tibia with a *p* seta (♂ without); frons about one-tenth head-width (Fig. 143)... *virago* sp. n., p. 600

47 (34) Mid tibia with only 1 *p* seta.

48 (49) Arista, including plumosity, as wide as third antennal segment. Mesonotum wholly fuscous-black on dorsum except for shoulder, notopleura, a narrow band just in front of scutellum and another along lateral part of suture. *m* markedly upcurved. Hind femur with *av* setae near apex only. Lower *stpl* well developed... *conica* Stein, p. 602

49 (48) Arista about a third width of third antennal segment, scutellum wholly, mesonotum largely, fuscous-brown to black.

50 (51) Jowls almost or fully as wide as third antennal segment. Normally 2 *p* setae on mid tibia, *see* par. 32. (It is possible that aberrant specimens with 4 *post dc* of the species falling under *par. 3* will also be traced here).

51 (50) Jowls hardly half as wide as third antennal segment. 3 or 4 *post dc*, *see angustibucca, par. 17.*

52 (1) r_1 setulose on apical part of dorsal surface. (4–5 *post dc*, the anterior ones small. Mid tibia with only 1 *p* seta. Antennae fuscous). (Sbg. *Heliographa*).

53 (54) *prst* spot separated from *post* band by a complete narrow pale grey dusted band (Fig. 144); apical and lateral margins of scutellum dusted grey. Arista plumose, slightly wider, including plumosity, than third antennal segment. Underside of scutellum bare.

	Antero-lateral margin of dark abdominal spots straight (Fig. 144).	*insignis* Stein, p. 604
54 (53)	*prst* spot fused with *post* band on median line (Fig. 145), the pale sutural band therefore narrowly interrupted; scutellum wholly fuscous-black. Arista narrower, including plumosity, than third antennal segment.	
55 (56)	Arista short-plumose, two-thirds as wide as third antennal segment, longest rays at least twice as long as its basal diameter. Underside of scutellum bare. 1+1 *stpl.* Ventro-basal scale with a fringe of very fine setulose hairs. . .	*ceylanica* sp. n., p. 607
56 (55)	Arista pubescent on basal half, longest hairs not or hardly longer than its basal diameter. Underside of scutellum with some black decumbent hairs on lateral part, especially towards base. 1+2 *stpl.* ♂ : Antero-lateral margin of abdominal spots sinuous.	*tonsa* Stein, p. 609

Sbg. **Limnophora** s. str.

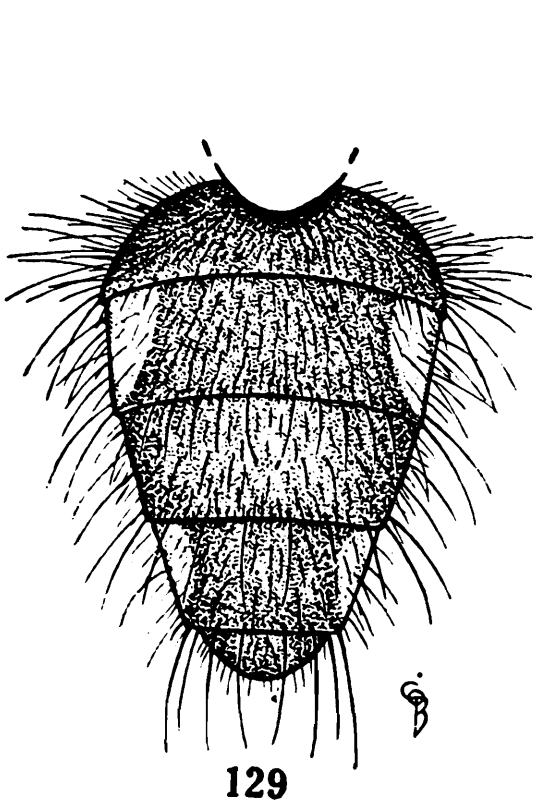
Possessing the characters of the genus. The species included in *Limnophora* s. str. differ from sbg. *Heliographa* Mall. only by the bare r_1. They are normally somewhat more slender, and the pattern is less contrasting than in *Heliographa*. The eyes of the males often more or less widely separated.

257. **Limnophora** (s. str.) **albonigra** sp. n.

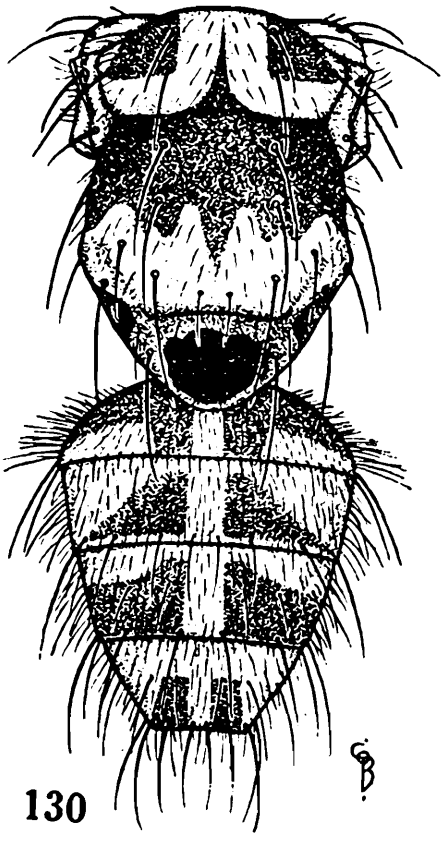
(Fig. 129)

♂ ♀ : Glossy black, thinly dusted brown; face, lower half of occiput, anterior end of parafrontalia, shoulder region and pleurae dusted silver-white; the declivity in front of scutellum, apart from a dark tongue on median line, the underside of the abdomen, and a latero-anterior triangle on the second and fourth tergites (Fig. 129) less densely dusted silver-white; antennae, palpi, proboscis and legs piceous-brown. *Head* almost twice as wide as long, eyes bare, separated in male by about one-seventh (0·15) head-width, frons rather strongly dilated to vertex and somewhat less to lunula, interfrontalia narrowed from vertex to beyond ocelli, parallel-sided from there almost to lunula, where they are suddenly narrowed, parafrontalia linear and thinly dusted on upper half, rather quickly dilated below, with a row of 7–8 fine inclinate

(and proclinate) setae, ocellars well developed, about half as long as frons, verticals indistinct; frons of female well over a third (0·36–0·38) head-width at vertex, very slightly dilated with slightly concave sides to lunula where it is about two-fifths (0·39–0·40) head-width, frontal triangle reaching lunula, embossed, moderately shining, very thinly dusted brown like rest of frons, interfrontalia somewhat narrowed behind, narrowed at lunula to less than half their greatest width, which is almost four times the smallest width of a parietale, the latter with 3 moderately strong inclinate setae on anterior



129



130

Fig. 129. *Limnophora albonigra* sp. n., abdomen of male.

Fig. 130. *Limnophora geminimaculata* sp. n., thorax and abdomen of male.

half, ocellars and verticals strong but not very long; parafacialia (in lateral view) about one-half, jowls quite, as wide as third antennal segment, the latter falling short of mouth-margin by less than its own width; arista plumose, slightly narrower, including plumosity, than third antennal segment, rays evenly decreasing in length from basal third onwards, the longest half as long as width of third antennal segment. *Thorax* with two rows of fine *prst acr* hairs with a hair or two between the rows, which are less widely separated from each

other than from the *dc*, *post acr* hardly more numerous, especially anteriorly, *prsc* small, 2+3 *dc*, both *ia* weak to indistinct; a few hairs adjacent to the prostigmal setae, lower *stpl* weak, much nearer to the posterior than to the anterior one. *Abdomen* (Fig. 129) oblong-ovate, somewhat pointed in female, narrowly rounded in male, the hypopygium being visible in dorsal view, fourth ventrite of male not emarginate, strongly convex and projecting downward towards apex, which reaches level of tip of hypopygium; setae very fine, lateral marginals present on all segments, second with a marginal row of longer setulae, third and fourth with a row of marginal setae, which are strong in male, lateral discals distinct on first, third and fourth segments. *Wings* greyish subhyaline, slightly smoky, veins brown to testaceous, r_{4+5} with only 1–2 setulae at base, r_1 reaching or slightly exceeding level of *r-m*, which lies well beyond middle of discal cell, r_{4+5} and *m* almost parallel at apex. Calyptrae greyish-white subopaque with concolorous border and fringe. Halteres pale reddish-yellow. *Legs* moderately slender; anterior tibiae without submedian setae except for the *p* seta of the mid tibia, mid femur with 2–3 fine *pv* setae near base and 2 *pd* pre-apicals, hind femur with 1–2 *av* near apex, 2–3 longer *pv* setulae near base and a *pd* pre-apical, hind tibia with the usual rather small *ad* and *av*.

Length.—2·8–3·5 mm., of wings 2·8–3·4 mm.

Distribution.—CEYLON: Suduganga, 23.XII.19 (*R. Senior White*), ♂ type, 1 ♀ paratype, 6.I.20, 2 ♀ paratypes (in B.M.).

258. **Limnophora** (s. str.) **geminimaculata** sp. n.

(Fig. 130)

♂: Fuscous-black, densely dusted greyish-white, mesonotum (Fig. 130) with a pair of large triangular *prst* spots from neck to second *prst dc* and *prst*, a narrow median vitta from suture to neck, where it tapers off, and a *post* band which is indented behind; scutellum (wholly ?, apex broken) dark; anterior four abdominal segments (Fig. 130) with paired spots, which are separated by a moderately broad whitish-dusted median vitta, spots of second and third segments triangular, not reaching front margins but lateral surface, much broader than long, spots of fourth segment oblong, extending from hind margin hardly beyond middle. *Head* twice as wide as long, eyes practically bare, contiguous (?, head somewhat deformed in type, which is teneral), frons slightly and equally dilated to

lunula and vertex, interfrontalia largely obsolete (?), parafrontalia very narrow in posterior half, gradually moderately widened to lunula, densely dusted silver-white and with about 7 evenly spaced inclinate setae over their entire length, only the first being moderately strong, ocellars rather strong, verticals fine and poorly differentiated; parafacialia about half (?), jowls about twice (?) as wide as third antennal segment, the latter falling short of mouth-margin by fully its own width; arista plumose, about as wide as third antennal segment, rays slowly and evenly decreasing in length from middle onwards, longest ones half as long as width of third antennal segment. *Thorax* with the *post* band reaching anterior postalar seta but indented on *ia* strip where it reaches only level of second *post dc*, on the *dc* strip extending half-way between second and third *post dc*, on either side of median line slightly beyond level of second *post dc*, and on median line almost to level of third *post dc*; *prst acr* in 4 irregular longitudinal rows, the outer ones equidistant from each other and the *dc*, *prsc* very small, anterior *prst dc* rather short, anterior *ia* absent; a few hairs adjacent to the prostigmals, lower *stpl* much smaller than anterior one and much farther from it than from posterior one, which is much the strongest. *Abdomen* ovate, hypopygium narrowly visible in dorsal view, fourth ventrite with a broad rounded excision, its lobes reaching level of tip of abdomen; anterior segments with well developed lateral marginals, second with weak setae completing the marginal row, third and fourth with a complete marginal row of strong setae, the paramedian pair somewhat more widely separated and, on fourth segment, a pair of weak setae between them; third segment with rather weak lateral discals, fourth with a discal row of strong setae, the paramedian pair, however, much weaker. *Wings* greyish subhyaline with testaceous veins, r_{4+5} with only 1–2 setulae at base, r_1 slightly exceeding level of *r-m*, which lies at three-fifths of discal cell, R_5 slightly narrowed to apex, r_{4+5} being markedly curved backward; *m-m* somewhat concave outwardly. Calyptrae whitish subopaque with pale ochraceous border and whitish fringe. Halteres pale reddish-yellow. *Legs* without submedian setae on anterior tibiae except for the *p* seta of the mid tibia; mid femur with 2–3 *pv* setae near base and a *pd* pre-apical, hind tibia with an *ad* seta at middle and an *av* slightly beyond.

Length.—4·8 mm., of wings 5·0 mm.

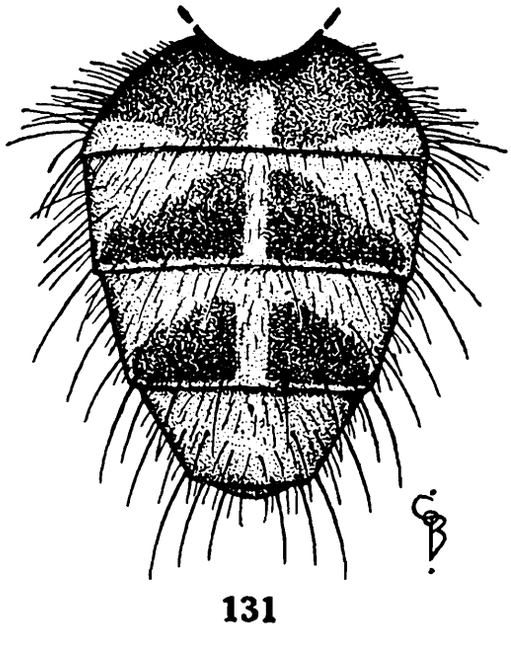
Distribution.—MALAYA: Larut Hills, Perak, 3,700 ft., 8.II.32 (*H. M. Pendlebury*), ♂ type (in B.M.).

259. **Limnophora** (s. str.) **mallochi** sp. n.

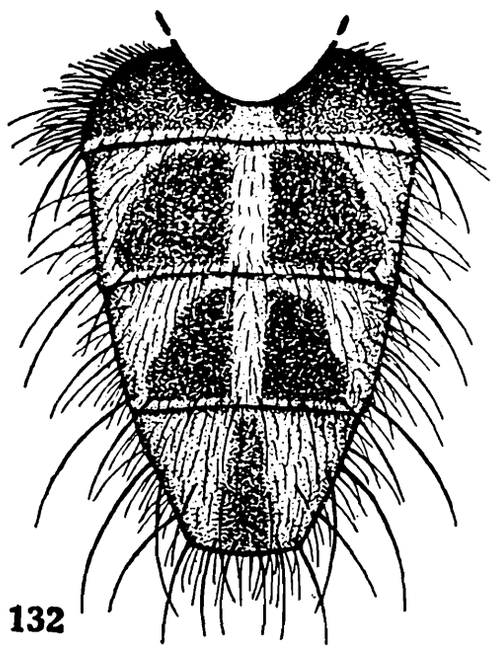
(Fig. 131)

1929. ? *Limnophora obscuripennis* Mall., *J. F. M. S. Mus.*, **XIV**, 456, ♂ (nec Stein). Type: Gunong Benom. Lost?

♂ ♀ : Fuscous, densely dusted whitish-grey, mesonotum with a broad fuscous, brown-dusted *post* band, the *prst* part in male largely fuscous with brown dust except on shoulders, notopleura and the greater outer part of suture, in female the large dark *prst* spot is almost completely divided by a pair of narrow grey-dusted paramedian vittae; scutellum very (♂) or rather (♀) narrowly pale dusted at apex; abdomen (Fig. 131) with large paired fuscous, somewhat brown-dusted spots on anterior



131



132

FIG. 131. *Limnophora mallochi* sp. n., abdomen of male.
FIG. 132. *Limnophora latiseta* sp. n., abdomen of male.

three segments, these spots cover the first segment entirely but for a narrow median vitta, they are triangular and wider than long on intermediate segments, fourth segment without (type) or with an incomplete median vitta. *Head* almost twice as wide as long, eyes practically bare, dusted silver-white with brown-dusted frons (♀) or at least greater posterior part of parafrontalia with some brownish dust (♂); eyes of male subcontiguous, separated by $\frac{1}{10}$ head-width, interfrontalia very narrow, parafrontalia linear in upper half, moderately dilated below, with 4 inclinate setae in lower half and with 2 proclinate ones from there almost to level of

anterior ocellus, ocellars rather weak, verticals very small and fine; frons of female about a third (0·31–0·35) head-width at vertex, somewhat dilated with straight sides to lunula where it is two-fifths (0·39–0·40) head-width, frontal triangle matt, brown-dusted, fading out at lunula, interfrontalia slightly narrowed behind, rather strongly in front, 5–6 times as wide at middle as a parafrontale, the latter with 3–4 inclinate setae on anterior three-fifths, ocellars moderately strong, verticals rather strong but not very long; parafacialia (in lateral view) half as wide, jowls half as wide again, as third antennal segment (in the Assam female somewhat narrower). Antenna falling short of mouth-margin by less than its own width; arista plumose, in male fully, in female almost, as wide as third antennal segment. *Thorax* with the *post* band almost or fully reaching the last *dc*, somewhat less wide on either side of median line, but with a tongue of the dark colouration on median line extending to level of last *dc*; *prst acr* in 3–4 irregular longitudinal rows, the outer ones in male less widely separated from each other than from the *dc*, in female as widely as from the *dc*, *prsc* small, anterior *prst dc* rather short, both *ia* rather weak; prostigmals and *stpl* as in *geminimaculata*. *Abdomen* ovate, in male narrowly rounded, in female narrowly truncate at apex, hypopygium visible in dorsal view, fourth ventrite broadly triangularly excised, not reaching level of tip of abdomen; anterior segments with distinct lateral marginals, second with a complete row of longer setulae, third with a marginal row, the setae of which become markedly weaker near middle, especially in female, fourth with a row of strong discals and in male strong, in female weak, marginals. *Wings* greyish subhyaline, slightly smoky in male, node at base of r_{4+5} with 1–3 setulae, r_1 somewhat exceeding level of *r-m*, which lies well beyond middle of discal cell, r_{4+5} and *m* evenly slightly converging to apex, *m* very shortly sinuous at extreme tip. Calyptrae greyish-white subopaque with concolorous border and fringe. Halteres pale reddish-yellow. *Legs* without submedian setae on the anterior tibia except for the *p* seta of the mid tibia; mid femur with 2–3 *pv* setae (♂) or setulose hairs (♀) near base and 2 *pd* pre-apicals; hind femur with 2–3 *av* setae near apex and a *pd* pre-apical, hind tibia with a small *ad* at middle and a small *av* slightly beyond.

Length.—Of type 4·6 mm., of wings 4·6 mm.; ♀ 3·5–4·7 mm., of wings 3·7–4·3 mm.

Distribution.—S. INDIA: Kodaikanal, 7,000 ft., 1.IV.36 (*B.M.-C.M. Expedition to S. India*), ♂ type (in B.M.). ? INDIA: Assam, 10 miles N. of Tinsukia, 29.III.44 (*D. E.*

Hardy), 1 ♀ (in U.S. National Mus.). N.E. BURMA: Kambaiti 2,000 m., 18.IV.–5.V.34 (*R. Malaise*), 2 ♀ (in Mus. Stockholm and B.M.). MALAYA: Gunong Benom, Pahang, 6,000 ft. (*obscuripennis*).

In view of the similarity of the species in this genus, it is hardly certain that the females belong to this species, especially as none of them were found at or even near the typical locality. In describing his *L. obscuripennis*, Malloch overlooked the fact that Stein had already described a very different Holarctic *L. obscuripennis* in 1921. As the type of Malloch's species is apparently lost, the present species is described as new, with *obscuripennis* Mall. as a doubtful synonym. The type is therefore not Malloch's lost specimen but the male from Kodaikanal in the B.M.

260. **Limnophora** (s. str.) **latiseta** sp. n.

(Fig. 132; Pl. 2, fig. 4)

♂ ♀: Fuscous-black, rather densely dusted whitish-grey, pattern of thorax as in *mallochi* but in male more fuscous, as the brown dust is thinner, in female suffused and not very conspicuous, the *post* band also incomplete, more or less interrupted by grey dust on the line of the *dc* and not passing the *ia* laterally, first abdominal segment as in *mallochi*, second and third with oblong-triangular spots (Fig. 132), which do not reach lateral surface, fourth with an, often incomplete, median vitta. *Head* dusted silver-grey with some brownish dust on facial ridges and the low ridge between the antennae (this dust more extended in the Assam specimens); parafrontalia in male with some brownish dust on upper half, in female wholly dusted pale grey; eyes practically bare, in male subcontiguous, separated by $\frac{1}{12}$–$\frac{1}{20}$ head-width, interfrontalia very narrow or linear above middle, dilated into an elongated triangle in front, parafrontalia linear, moderately dilated near lunula, with about 6 inclinate setae on anterior half, the first strong, the others quickly becoming small, and a proclinate setula at level of anterior ocellus, ocellars fine but long, verticals very fine, distinctly longer than setulae of occipital row; frons of female almost a third (0·31–0·32) head-width at vertex, rather strongly dilated with almost straight sides to lunula where it is two-fifths (0·39–0·41) head-width, frontal triangle not embossed, rather densely dusted pale brownish-grey, distinct only in certain directions, fading out near lunula, interfrontalia slightly narrowed behind, moderately strongly in front, 3–3½ times as wide at

middle as a parafrontale, the latter on slightly more than anterior half with 4 inclinate setae, the first and last of which are strong, and on outer part with an irregular row of black proclinate setulae, ocellars strong, verticals strong but only moderately long; parafacialia more than half as wide, jowls half as wide again, as third antennal segment, the latter falling short of mouth-margin by its own width; arista plumose, slightly wider, including plumosity, than third antennal segment, rays evenly decreasing in length from second fifth onwards, longest rays about three-fifths as long as width of third antennal segment. *Thorax* with the *prst acr* in about four irregular longitudinal rows, the outer ones equidistant from each other and the *dc*, *prsc* small, anterior *prst dc* only slightly shortened, both *ia* not very strong; only 1–2 setulose hairs adjacent to the prostigmals, lower *stpl* somewhat weaker than anterior, both much weaker than posterior one, from which the lower is less widely separated. *Abdomen* elongate-ovate in male (Fig. 132), ovate in female, apex somewhat truncate even in female, hypopygium not visible in dorsal view, not reaching apex of abdomen, fourth ventrite of male broadly and moderately deeply excised; outer side (hypotenuse) of the triangular spots usually somewhat emarginate, more strongly so in female; anterior three segments with well developed lateral marginals, which are somewhat more numerous on the third, the marginal rows completed by inconspicuous setulose hairs; fourth segment with a row of strong discals and moderately strong marginals. *Wings* (Pl. 2, fig. 14) greyish subhyaline with light brown veins, in male slightly smoky, r_1 reaching level of *r-m*, which lies near three-fifths, in male sometimes at two-thirds, of discal cell, r_{4+5} with 1–2(–3) setulae on basal node, gently curved backward at apex where *m* is considerably upcurved at about apical third of last section and somewhat sinuous. Calyptrae greyish-white subopaque with concolorous border and fringe. Halteres pale reddish-yellow. *Legs* without submedian setae on anterior tibiae except for the *p* of the mid tibia; mid femur with 3–5 strong *pv* setae, a fringe of somewhat longer (especially in male) *pv* setulae from there to apex, and 2 *pd* setae; hind femur in addition to the *ad* row and a *pd* pre-apical in male with a dense row of setulose hairs on *av* and *pv* surfaces, the *pv* ones much longer near base, the *av* ones somewhat longer towards apex, the last 2–3 being developed as *av* pre-apicals, hind femur of female similar, but the short setulae much shorter and only slightly differentiated from the covering hairs.

Length.—4·1–5·7 mm., of wings 4·0–5·4 mm.

Distribution.—N.E. BURMA: Kambaiti, 2,000 m., 20.V.34 (*R. Malaise*), ♂ type (in Mus. Stockholm), 6.IV.–23.V.34, 6 ♂, 33 ♀ paratypes (in Mus. Stockholm, Helsinki and B.M.). N. INDIA: 6 miles N. of Tinsukia, Assam, 15.III.44 (*D. E. Hardy*), 1 ♂, 1 ♀ paratypes (in U.S. Nat. Mus.); Sadiya, Assam, 13.II.44 (*D. E. Hardy*), 2 ♂ paratypes (in U.S. Nat. Mus. and B.M.); Potsengbom, Manipur, Assam, II.20 (*Marine Survey*), 2 ♀ paratypes (in Ind. Mus., Calcutta); Darjeeling, 6,000 ft., 25.IX.08 (*Brunetti*), 1 ♀ paratype (in Ind. Mus., Calcutta). S. INDIA: Mysore, 4,400 ft., Arabidacodi Est., 25.III.–29.IV.13 (*P.S.*), 4 ♀

261. **Limnophora** (s. str.) **albitarsis** Stein.

1915. *Limnophora albitarsis* Stein, *Suppl. ent.*, **IV**, 34, 39; 1918, *Ann. Mus. nat. Hungar*, **XVI**, 155; 1920, *Tijdschr. Ent.*, **LXII**, suppl., 55; Mall., 1928, *Ent. Mitt.*, **XVII**, 291, 296. Type: Takao. Mus. Budapest.

1951. ! *Limnophora quadristriata* Emden, *B. M. Ruwenzori Exped.*, **II**, 382, 390, 702. Type: Robertsport (Liberia). B.M. n. syn.

Fuscous with dense pale grey dust, mesonotum with a pair of rather broad paramedian brown-dusted vittae, which reach the *dc* laterally, and often with a paired narrower outer vitta between the *dc* and *ia*, scutellum usually wholly dusted brown, abdomen with a grey-dusted median vitta, first segment otherwise wholly dark on dorsum, second and third with paired triangular spots, which are much wider than long, fourth with a pair of oblong brown-dusted spots. Mid tibia of male pale testaceous (? in the Oriental form), basal two segments of mid tarsi very long and slender, pale yellow, apical three segments short, strongly dilated and black. *Head* shaped somewhat as in *Atherigona*, dusted silver-white on face and anterior part of parafrontalia, posterior part of frontal triangle dusted pale grey, anterior part dusted fuscous and not much contrasting with interfrontalia; eyes practically bare; frons of male at vertex and lunula almost one-half (0·46) head-width, sides slightly concave, frons of female slightly widened to lunula where it is one-half (0·50) head-width, frontal triangle rather broad with somewhat convex sides, reaching lunula in a slightly blunted point, interfrontalia markedly narrowed with straight sides from vertex to lunula, six times as wide at middle as a parafrontale, the latter with 2 inclinate and 1 reclinate seta, ocellars and verticals moderately strong, parafacialia linear, jowls two-thirds width of third antennal segment, the latter almost

reaching mouth-margin; arista pubescent, including hairing hardly a fourth width of third antennal segment, longest hairs shorter than its basal diameter. *Thorax* in front of suture with two rows of *acr* and 1–2 hairs between them, *prsc* small, both *ia* not very strong; no hairs adjacent to prostigmals, lower *stpl* fine or indistinct, closer to posterior than to anterior one. *Abdomen* short-ovate to subglobular, in female pointed, in male rounded at apex, genital segments of male rather broadly visible in dorsal aspect, fourth ventrite broad and convex, excision broadly rounded; tergites with only lateral marginals, but fourth tergite of female with a row of not very strong marginals. *Wings* greyish subhyaline with a very slight brownish tinge, strongly iridescent, r_1 slightly, in the Kambaiti specimen conspicuously, exceeding level of *r-m*, which lies at or somewhat beyond (in the Kambaiti specimen somewhat basad of) middle of discal cell, *m* almost unnoticeably and quite evenly upcurved in apical section, r_{4+5} very gently curved backward, the two veins thus very slightly converging. Calyptrae whitish with concolorous border and fringe, lower one opaque. *Legs* without submedian setae on anterior tibiae except for the *p* seta of the mid tibia, mid femur with an *a* seta towards middle and with only 1, rather strong, *p* pre-apical; hind femur with 1(–2) *av* pre-apicals, hind tibia with an *ad* and an *av* seta.

Length.—2·1–2·7 mm., of wings 1·9–2·7 mm.

Distribution.—S. INDIA (Coimbatore). N.E. BURMA. FORMOSA. JAVA. SUMATRA. TANGANYIKA. BELG. CONGO. LIBERIA.

The only available Oriental female with a head has the frontal triangle wholly dusted and matt, as is the case in the male type of *quadristriata* Emd., but three female paratypes of *quadristriata* have the anterior part (in front of the anterior ocellus) shining in dorsal view.

262. **Limnophora** (s. str.) **angustatifrons** sp. n.

♂: Fuscous-black, rather densely dusted pale grey, mesonotum with a bluish tinge and, behind suture, an inconspicuous narrow brown-dusted vitta to the other side of the *dc* and apparently a broad median spot, the latter narrowly extended forward to level of second *prst dc*; scutellum dusted brown on basal half, the dark area extending farther towards apex on lateral surface; abdomen with paired, rather broadly separated roundish dark spots on first to fourth segments, the spots lying close to hind margin and diminishing in size to the fourth segment. *Head* almost as high as wide, densely

dusted brownish-grey; eyes large and bare; frons at vertex more than a third (0·35) head-width, moderately narrowed to lunula where it is more than a fifth (0·22) head-width, sides slightly concave, frontal triangle almost reaching middle, apex undusted, the rest dusted brownish-grey, the area thus appearing ovate rather than triangular, interfrontalia thinly dusted, evenly narrowed forward, parafrontalia densely dusted, narrow, gradually becoming slightly wider in front, with 5 subequal (but for the stronger first one) inclinate setae, the only reclinate seta moderately strong, practically at level of anterior ocellus and slightly less widely separated from the last inclinate seta than this from the last but one, outward to the setae a row of fine setulose hairs, ocellars strong, inner verticals slightly, outer ones conspicuously, shorter; jowls at narrowest part half as wide as third antennal segment, the latter falling short of mouth-margin by more than half its own width; arista short-haired, including hairing about a third width of antennae, longest hairs about as long as its basal diameter. *Thorax* with four rows of *acr* in front of suture, the outer ones somewhat more widely separated from each other than from the *dc*, *prsc* distinct, 2+3 strong *dc*, anterior *ia* weak, posterior one moderately strong, a few hairs adjacent to the prostigmal setae, anterior and lower *stpl* rather weak, the latter much nearer to the posterior than to the anterior one. *Abdomen* short-ovate, somewhat flattened, apex rounded-truncate, the hypopygium being narrowly visible in dorsal view, but not projecting in lateral view; lateral marginals and discals almost indistinct on anterior segments, well developed on fourth segment, the marginals also on third. *Wings* greyish subhyaline with pale testaceous veins; r_{4+5} with only one setula at base; r_1 reaching level of *r-m*, which lies near three-fifths of discal cell, r_{4+5} and *m* very slightly converging at apex, *m* almost inappreciably upcurved to apex. Calyptrae greyish-white with concolorous border and fringe, the lower one opaque. Halteres pale reddish-yellow. *Legs* dull brown, fore tibia without submedian setae; mid femur without outstanding setae, with a bare *pv* strip from base to apex just above the *pv* setulae, mid tibia with a *p* seta at middle and 1(–2) others near apical fourth; hind femur with a row of short and fine *av* setae from base to apex, the pre-apical ones hardly stronger, and a similar row on *pv* surface, hind tibia with an *ad* and *av* at middle.

Length.—3·1 mm., of wings 2·8 mm.

Distribution.—E. PAKISTAN: Lyallpur, 22.IV., ♂ type (in B.M.).

263. **Limnophora** (s. str.) **fallax** Stein.

1915. *Limnophora maculosa* (Meig.) of Stein, *Suppl. ent.*, **IV**, 37, 39 (nec Meig.).
1920. *Limnophora fallax* Stein, *Tijdschr. Ent.*, **LXII**, suppl., 72; Mall., 1928, *Ent. Mitt.*, **XVII**, 295. Type: Air Njuruk (Sumatra). Mus. Amsterdam.

Fuscous-black, densely dusted whitish-grey with a fuscous, thinly brown-dusted pattern; legs piceous-brown. *Head* densely dusted silver-grey, frontal triangle and parafrontalia of female as a rule densely dusted brown; eyes virtually bare, in male separated by $\frac{1}{7}$–$\frac{1}{10}$ head-width, interfrontalia black, somewhat velvety, parallel-sided or very slightly dilated to extremities, about 2–3 times as wide at middle as a parafrontale, the latter linear in posterior half, gradually somewhat broadened in anterior half, with a row of 8–10 setae of which the upper 2–3 around level of anterior ocellus are fine and proclinate, ocellars rather strong, verticals fine but distinct; frons of female at vertex about a third (0·30–0·34) head-width, slightly dilated with hardly concave sides to lunula, where it is almost two-fifths (0·35–0·41) head-width, frontal triangle rather densely dusted pale brown in upper half, poorly defined in lower half, fading out towards lunula, interfrontalia slightly narrowed behind, but strongly so at lunula, 4–5 times as wide at middle as a parafrontale, the latter on slightly more than anterior half with four rather strong inclinate setae, and, on outer part, with a row of proclinate black setulae, ocellars and verticals strong; parafacialia about two-thirds, jowls $1\frac{1}{2}$–2 times, width of third antennal segment, the latter falling short of mouth-margin by half its own width; arista short-haired, hardly half as wide, including plumosity, as third antennal segment. *Thorax* with a dark median and a pair of broader outer vittae, all of which are broader at suture and taper off at neck, the outer vittae often interrupted by pale grey dust along suture or fused with the median vitta at level of posterior *prst dc*, all these vittae fused into a transverse band caudad of suture, but this band deeply indented to the inner side of the *dc* and on the line of the *ia*, sometimes even interrupted, its median extension reaching the *prsc*; scutellum dark with grey-dusted apex in male, grey-dusted with an oblong dark lateral spot at each side of base in female; *prst acr* in 2–3 rows near neck but in 4 towards suture, *prsc* small, anterior *prst dc* only moderately shortened, both *ia* rather weak; a few hairs adjacent to prostigmal setae, lower *stpl* well developed, closer to posterior than to anterior one. *Abdomen*

in male ovate with rounded apex, the hypopygium narrowly prominent in dorsal view, dusted pale grey, in female short-ovate with pointed apex, fourth ventrite of male with a deep subtriangular to rounded excision, the lobes obliquely truncate and dull fuscous-black; first segment fuscous with brown dust, outer part of hind margin and, as on segments 2–4, a moderately narrow median vitta dusted pale grey, intermediate segments with a pair of large rounded-triangular spots, their antero-lateral margin (hypotenuse) emarginate in female, fourth segment with a pair of oblong spots extending forward from hind margin to, or beyond, middle; anterior segments with conspicuous lateral marginals, setulae completing the marginal row on the second; third and fourth segments with a row of strong marginals, fourth also with a row of strong discals, third with some lateral discals. *Wings* greyish subhyaline with brown to dark brown veins; r_1 slightly exceeding level of *r-m*, which lies well beyond middle of discal cell, *m* slightly upcurved at apex, somewhat converging with r_{4+5}. Calyptrae greyish-white subopaque with concolorous border and fringe, in the Shillong males somewhat infuscated on disc. Halteres dull reddish-yellow. *Legs* without submedian setae on anterior tibiae, except for the *p* seta (in one of the Shillong specimens 2 *p* setae) of the mid tibia, mid femur with a row of short *a* setae on basal half, a weak *pv* seta at base, sometimes a few more erect *pv* setulae following upon this seta, and 2 *pd* pre-apicals; hind femur with 2–4 *av* setae near apex, a rather strong *pd* pre-apical and often some half-erect *pv* or *av* setulae near base, hind tibia with an *ad* and *av* seta.

Length.—4·0–5·6 mm., of wings 4·2–5·4 mm.

Distribution.—SUMATRA. FORMOSA. N. INDIA (Khasia Hills). S. INDIA (Kodaikanal, Coonoor).

A female from Coonoor has the abdominal spots much smaller and especially shorter and the aristal hairs slightly longer. Originally Stein identified this species as the European *L. maculosa* Meig., and the thoracic pattern is indeed very similar. In addition to the wider frons and jowls and the somewhat less extended thorax pattern *maculosa* differs from the present species by two *p* setae on the mid tibia and the dark median spot of the fourth tergite.

264. **Limnophora** (s. str.) **prominens** Stein.

1904. *Limnophora prominens* Stein, *Tijdschr. Ent.*, **XLVII**, 106; 1909, *ibid.*, **LII**, 244; 1915, *Suppl. ent.*, **IV**, 39; 1918, *Ann. Mus. nat. Hungar.*, **XVI**, 174; Mall., 1928, *Ent. Mitt.*, **XVII**, 291, 294. Type: Java. Mus. Amsterdam.

Fuscous-black with rather dense whitish dust and an extended fuscous, brown-dusted pattern which usually occupies all the mesonotum except for the shoulders, notopleura, a narrow band above lateral part of suture and a somewhat broader one in front of scutellum, as a rule interrupted by a dark median vitta; sometimes two pale dusted vittae are partly or completely developed to the inner side of the *dc*, delimiting the original three dark vittae, scutellum somewhat greyish-dusted at tip; dark pattern of abdomen occupying the first segment except for a vestigial median vitta and dorso-lateral part of hind margin, an elongate to triangular median spot on the fourth, and a pair of rounded-triangular spots on second and third. *Head* moderately densely dusted pale grey with brown-dusted parafrontalia; eyes practically bare, subcontiguous (separated by $\frac{1}{10}$–$\frac{1}{20}$ head-width) in male, interfrontalia linear or very narrow, or very slightly dilated to extremities, parafrontalia linear, slightly dilated to lunula, with 7–10 fine setae of which the upper 2–3 are proclinate, ocellars moderately strong, verticals fine and rather indistinct; frons of female about a third (0·31–0·35) head-width at vertex, slightly dilated with very slightly concave sides to lunula where it is less than two-fifths (0·36–0·39) head-width, frontal triangle poorly defined, narrow, somewhat dusted light brown above, fading out towards lunula, interfrontalia slightly narrowed to vertex, rather strongly to lunula, about four times as wide at middle as a parafrontale, the latter with 4 strong inclinate setae on slightly more than anterior half and, to their outer side, a few small black proclinate setulae, ocellars and verticals strong; parafacialia in male a third, in female more than half as wide, jowls a third (♂) to more than half (♀) as wide again as third antennal segment, the latter falling short of mouth-margin by more than half its own length; arista short-haired, about a third width of third antennal segment. *Thorax* with four irregular longitudinal rows of *acr*, the outer ones at least as widely separated from each other as from the *dc*, *prsc* small, both *ia* rather weak; a few setulose hairs adjacent to the prostigmals, lower *stpl* rather weak, closer to posterior than to anterior one. *Abdomen* oblong-ovate, apex in male narrowly rounded, the hypopygium moderately projecting posteriorly, in female subacuminate, narrowly truncate, fourth ventrite with a broad and not very deep rounded apical excision, apical third fuscous; setae as in *fallax*. *Wings* greyish subhyaline with brown to dark brown veins, very slightly smoky; r_1 reaching or slightly exceeding level of *r-m*, which lies beyond middle or at three-fifths of discal cell, *m* slightly upcurved at apex,

converging with r_{4+5}. Lower calyptra subopaque, somewhat yellowish-smoky with paler border and whitish fringe. Halteres dull reddish-yellow. *Legs* without submedian setae or anterior tibiae except for 1–2 *p* setae on mid tibia; mid femur with a row of small *a* setae which terminates towards middle in a stronger one, with 1–2 *pv* setae near base, and with 2 *pd* pre-apicals; hind femur with 2–4 *av* setae near apex and a *pd* pre-apical, hind tibia with an *ad* and *av* seta.

Length.—3·8–6·0 (6·5, Stein) mm., of wings 3·8–5·3 mm.

Distribution.—JAVA. SUMATRA. JAPAN. N. INDIA (Assam). N.E. BURMA.

The description has been made from four Japanese specimens named *prominens* by Stein and mentioned in his 1918 paper, Assam specimens in the B.M. and the U.S. National Museum and Dr. Malaise's Kambaiti specimens. Three of Stein's four specimens and almost all the other material have only one *pd* seta on the mid tibia, whereas Stein's original description, based on eight specimens, mentions two *pd* setae. This character has been found to be generally variable in the Oriental species with only 3 *post dc*. The females of this species can at present not definitely be distinguished from most of those of the following nine species, and for the above description a Japanese specimen named by Stein and three of Dr. Malaise's Kambaiti females have been picked out, which like the Japanese female are relatively large and have an elongate, well defined somewhat rusty-brown median spot in the fourth tergite.

265. **Limnophora** (s. str.) **angustibucca** sp. n.

(Fig. 133)

♂ ♀: Fuscous-black with dense bluish-grey to greenish-grey dust, disc of mesonotum suffusedly dusted brown, interfrontalia piceous-black, cerebrale largely fuscous, abdomen with a pair of large transversely-triangular spots on anterior three segments, those of the first occupying almost all of dorsal surface, those of the intermediate segments leaving pale dusted a linear hind margin, the lateral declivity, an antero-lateral triangle, which may be connected with the median vitta, and a moderately narrow median vitta, fourth segment unspotted (♂) or with a brown median vitta and a pair of suffused round spots (♀). *Head* (Fig. 133) densely dusted greenish-grey with the interfrontalia thinly and the frontal triangle more thickly dusted brownish, parafrontalia with slight (♂) or dense (♀) brown dust; eyes practically bare, separated by

three-tenths (0·29–0·30) head-width at vertex, frons very slightly narrowed to beyond middle, where it is 0·27 times head-width, and somewhat more strongly dilated to lunula, where it is almost a third (0·31–0·32) head-width, frontal triangle only visible by the pale dust, fading out at lunula, interfrontalia slightly and evenly narrowed forward, fully six times as wide as the almost linear parafrontalia, the latter on anterior half with 3–4 inclinate setae, of which the first and

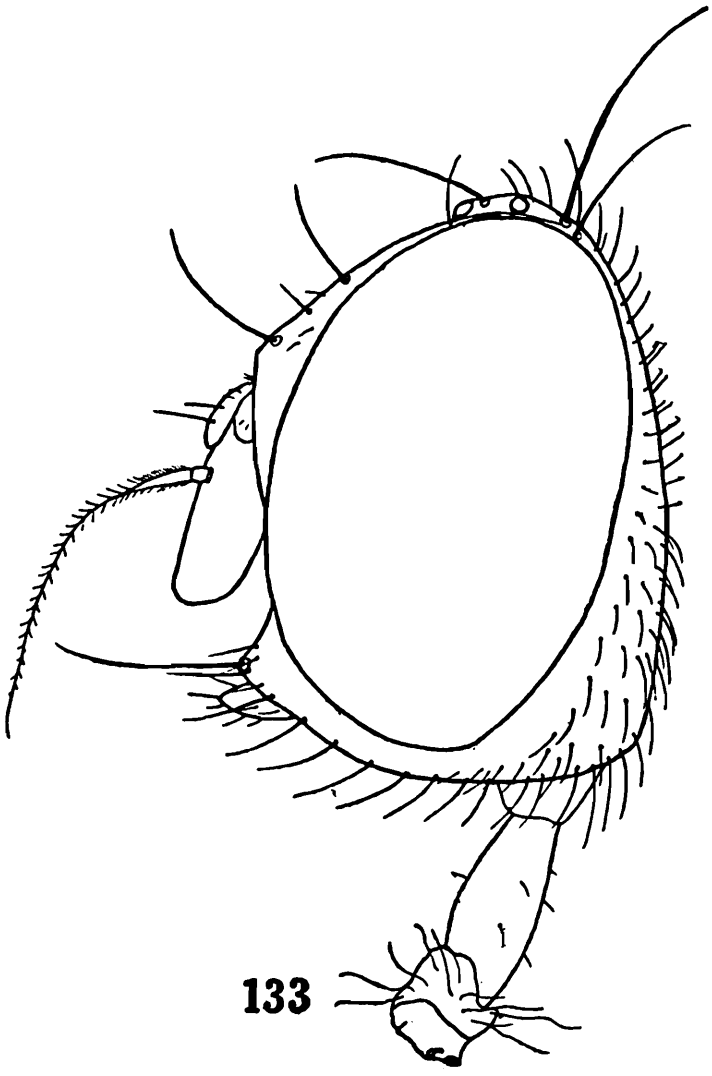


FIG. 133. *Limnophora angustibucca* sp. n., head of male.

last are moderately strong, the other one or two setulose, and at level of anterior ocellus with a moderately strong reclinate seta, ocellars and outer verticals moderately strong, inner verticals strong; parafacialia linear at middle, jowls less than half as wide as third antennal segment, the latter falling short of mouth-margin by half its own width; arista short-haired, about a third as wide as third antennal segment. *Thorax* with the *acr* in only two loose rows on the whole

length, only 1–2 additional *acr* hairs being present on either side near scutellum, 2+3 or 2+4 strong *dc*, both *ia* moderately strong; lower *stpl* weaker than, or subequal to, anterior one, from which it is much more widely separated than from posterior *stpl*. *Abdomen* short-ovate, almost subcircular, segments strongly transverse, fourth a quarter longer than third, apex in female pointed, in male somewhat rounded, the hypopygium being somewhat visible in dorsal view; anterior three segments with strong lateral marginals and very weak, in female more distinct, lateral discals, fourth with a row of strong, in female weak, marginals and conspicuous discals. *Wings* subhyaline with a slight brownish tinge and brown veins, r_1 virtually reaching (♂) or slightly exceeding (♀) level of *r-m*, which lies towards or slightly beyond three-fifths of discal cell, apical section of *m* almost straight, r_{4+5} gently curved backward; the two veins thus slightly converging towards apex. Calyptrae greyish-white with concolorous border and fringe. *Legs* without submedian setae on anterior tibiae except for a *p* on mid tibia; mid femur with 4–6 *pv* setae on basal half or more, 2 *pd* pre-apicals and on *av* and *pv* surfaces a row of slightly longer setulose hairs; hind femur with 3–4 rather long *av* setae in apical half and in male 1–2 rather long *pv* near middle, in female 4–6 *pv* on basal half or somewhat more; hind tibia with a strong *ad* seta at middle and a considerably smaller *av* somewhat beyond.

Length.—3·0–4·2 mm., of wings 3·2–4·1 mm.

Distribution.—MALAYA: Gunong Benom, Pahang, 6,000 ft., 27.VII.25, at light (*I.H.N Evans*), ♂ type, 5.VIII.25, 1 ♀ paratype (in B.M.); Tanah Rala, Cameron's Highlands, Pahang, 4,800 ft., 19.V.31 (*H. M. Pendlebury*), 1 ♂, 1 ♀ paratypes (♂ in B.M., ♀ in U.S. Nat. Mus., Washington).

266. **Limnophora** (s. str.) **pendleburyi** sp. n.

(Fig. 134)

♂: Fuscous with moderately dense pale grey dust, a narrow *prst* median vitta, rather large triangular *prst* spots and all the *post* part of mesonotum except a pale dusted spot on either side in front of scutellum, fuscous with brown dust, but rather suffused and not strongly contrasting, scutellum dark with brown dust except for a small suffusedly grey-dusted apical part, abdomen with paired triangular spots on intermediate segments, legs and palpi piceous-brown. *Head* (Fig. 134) rather more densely dusted whitish-grey on jowls, parafacialia and parafrontalia, interfrontalia fuscous-black

and not contrasting with parafrontalia, in anterior view dusted whitish; eyes practically bare, separated at vertex by 0·26, at middle of frons by 0·22 and at lunula by almost 0·30 times head-width, frontal triangle obsolescent, hardly exceeding basal third of frons, interfrontalia almost parallel-sided, parafrontalia on anterior three-fifths with 4–5 inclinate setae, of which only the first is somewhat stronger, ocellars strong, verticals weak but quite conspicuous; parafacialia a third, jowls almost equal to, width of third antennal segment, the latter falling short of mouth-margin by half its own width; arista short-haired, including plumosity less than a quarter width of third antennal segment, longest hairs about as long as its basal diameter. *Thorax* with four irregular

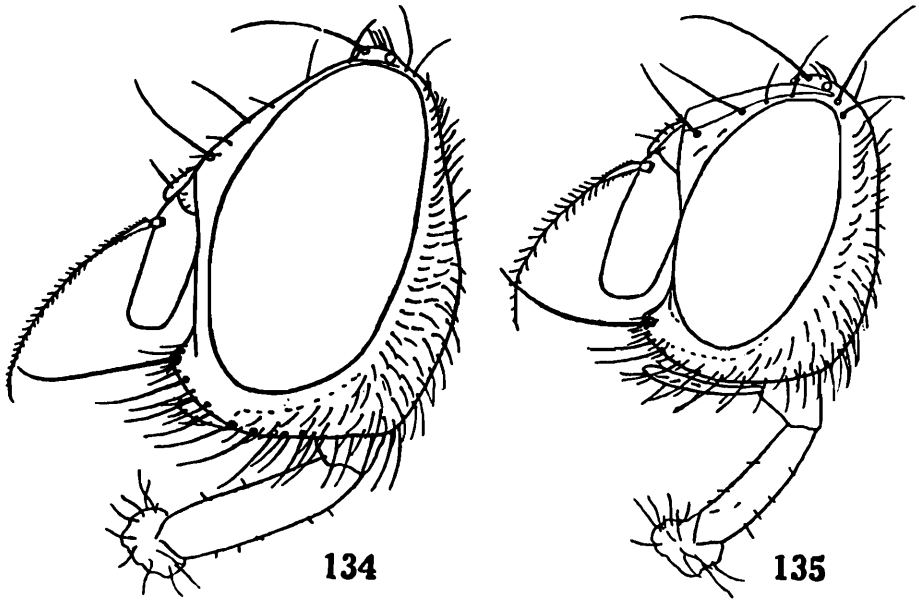


FIG. 134. *Limnophora pendleburyi* sp. n., head of male type.
FIG. 135. *Limnophora breviceps* sp. n., head of male type.

longitudinal rows of *prst acr*, the outer ones more widely separated from each other than from the *dc*, *prsc* not very distinct, anterior *ia* weak; a few hairs adjacent to prostigmals, lower *stpl* only slightly weaker than anterior one, closer to posterior than to anterior *stpl*. *Abdomen* ovate, apex rounded-truncate, hypopygium only very narrowly visible in dorsal view, dorsal surface of first segment almost wholly fuscous-brown with bronze reflections; second and third with paired bronze-fuscous-brown spots, which are slightly wider than long and which extend from hind almost to fore margin, fourth with a pair of small oblong spots near hind margin; second to fourth segments with a row of strong marginals though on second and third these are somewhat weaker towards middle with a broader median gap, third segment

with distinct and fourth with strong lateral discals, which on fourth segment nearly form a discal row. *Wings* greyish subhyaline with a slight brownish tinge and brown veins, r_1 only just reaching level of *r-m*, which lies at three-fifths of discal cell, *m* evenly and hardly noticeably upcurved to apex where r_{4+5} is conspicuously curved backward, so that R_5 is quite appreciably narrowed. Calyptrae greyish-white sub-opaque with concolorous border and fringe. *Legs* without submedian setae on anterior tibiae except for a *p* on mid tibia; mid femur with 2 strong *pv* setae in basal quarter and 2 *pd* pre-apicals; hind femur with 1–2 *av* pre-apicals, hind tibia with only an *ad* seta near middle.

Length.—Body and wings both 3·8 mm.

Distribution.—MALAYA: Cameron's Highlands, No. 4 Camp, Pahang, 4,800 ft., 14.VI.23, at light (*H. M. Pendlebury*), ♂ type (in B.M.).

Too much reliance should perhaps not be placed on the absence of the *av* seta of the hind tibia as a species character, as this seta is also absent from one if not both hind tibiae of a female of the large Kambaiti series mentioned on p. 576 as doubtfully belonging to *prominens*.

267. **Limnophora** (s. str.) **brunnescens** sp. n.

♂ ♀: Fuscous, dusted pale grey, dorsal surface of male dusted brownish-grey, disc of mesonotum and scutellum in male uniformly dusted brown, in female the former with three rather broad brown vittae and the scutellum with a brown spot at base of dorso-lateral surface; first abdominal segment on dorsal surface almost wholly fuscous with brown dust, second and third with paired large triangular dark spots, which are wider than long, especially in female, and somewhat suffused in male, fourth in male unspotted, in female with a narrow brown-dusted median vitta. *Head* densely dusted brown-grey (♂) or whitish-grey (♀), interfrontalia dark brown to blackish-brown, somewhat velvety, parafrontalia densely dusted brown; eyes practically bare, separated (♂ ♀) by two-fifths (0·38–0·43) head-width, frons almost parallel-sided, frontal triangle dusted brownish-grey, appearing slightly embossed, reaching lunula, interfrontalia slightly narrowed behind, more strongly so in front, 4–5 times as wide at middle as a parafrontale, the latter on anterior half with 3–4 moderately strong inclinate setae, and with some setulae on outer part, ocellars and verticals moderately strong; in male parafacialia linear below middle and jowls less wide than third antennal segment, in female parafacialia

more than a third, jowls fully, width of third antennal segment, the latter falling short of mouth-margin by hardly half its own width; arista very short-haired, including hairing about one-quarter width of third antennal segment, longest hairs about as long as its basal diameter. *Thorax* with 4(–3) irregular longitudinal rows of *prst dc*, the outer rows more widely separated from each other, at least near suture, than from the *dc*, *ia* weak, especially the anterior one; 1–2 minute hairs adjacent to prostigmals, lower *stpl* somewhat weaker than anterior one and closer to posterior than to anterior *stpl*. *Abdomen* short-ovate with pointed apex (♀) or very short-ovate with rounded apex (♂), hypopygium rather broadly visible in dorsal aspect, segments strongly transverse, fourth ventrite shallowly emarginate in ventral view but with a deep, rather broad excision in posterior view, the lobes being directed dorsally, third and fourth segments of male with lateral marginals, fourth also with lateral discals, in female all segments with lateral marginals, second to fourth also with lateral discals and with setulose marginals which complete the rows. *Wings* greyish subhyaline with brown to light brown veins; r_1 reaching level of *r-m*, which lies towards or at three-fifths of discal cell, *m* evenly and very slightly upcurved in apical half of last section, r_{4+5} somewhat curved backward, R_5 therefore distinctly narrowed. Calyptrae sub-opaque, greyish-white, margin usually somewhat yellowish, fringe whitish. *Legs* without submedian setae on anterior tibiae except for the *p* seta of the mid tibia, mid femur in male with 2 *pv* setae in basal third, and with 2 *pd* pre-apicals; hind femur with 1–2 *av* pre-apicals and in male a *pv* seta towards middle, hind tibia with an *ad* and *av* seta.

Length.—2·3–3·8 mm., of wings 2·5–3·9 mm.

Distribution.—N. INDIA: Darjeeling, 6,000 ft., 24.IX.08, sweeping in grass and low herbage (*E. Brunetti*), ♂ type (in Indian Mus., Calcutta), 22.IX–1.X.08, 3 ♂, 12 ♀ paratypes, 7,000 ft., 8–9.VIII.09 (*C. Paiva*), 2 ♀ paratypes, 7,000 ft., 2.VIII.09 (*J. T Jenkins*), 1 ♂ paratype (paratypes in Indian Mus. and B.M.); Macflang, Khasia Hills, Assam, 10.X.20, on scrub (*R. Senior White*), 1 ♀ paratype (in B.M.); Shillong, Khasia Hills, Assam, 6.X.20, in forest (*R. Senior White*), 1 ♀ paratype (in B.M.), 13.X.20, at flowering tree, 1 ♀ paratype (in B.M.). N.E. BURMA: Kambaiti, 7,000 ft., 11.V.34 (*R. Malaise*), 1 ♂ paratype (in Mus. Stockholm).

On the average the frontal width of the male is apparently very slightly smaller (0·38–0·41 times head-width) than in the female (0·40–0·43), and the ocellars and verticals also seem to be very slightly stronger in the latter sex.

L. veniseta Stein from Java (type loc.), Sumatra (*see* Malloch 1928, *Ent. Mitt.*, **XVII**, 290, 293) and Formosa is similar in its characters to this and the following 6 species but differs conspicuously by the more developed setulae on basal part of r_{4+5} which approach or pass *r-m*, whereas in all the species described here they are confined to the vicinity of the basal node. If the mouth-margin is considered to be not markedly produced in the present species, the male will be traced to *breviceps*, which differs by a much wider and shorter frons, and the female will at present remain indistinguishable from the other females of that group.

268. **Limnophora** (s. str.) **breviceps** sp. n.

(Fig. 135)

♂: Fuscous-black, moderately densely dusted whitish-grey, frons and mesonotum largely dusted dark brown, shoulders, notopleurae, a narrow sutural band, which is interrupted at middle, and declivity in front of scutellum pale dusted, scutellum wholly dark; first abdominal segment wholly dark on dorsal surface, intermediate segments with strongly transverse, band-shaped spots which extend suffusedly towards fore margin on either side of middle, and which are indefinitely separated by greyish dust on median line, fourth segment with a median spot which is narrow at base and occupies almost the whole width at apex. *Head* (Fig. 135) with brownish-grey-dusted clypeus and whitish-grey-dusted jowls and parafacialia; eyes practically bare, frons almost one-half (0·48) head-width at vertex, moderately narrowed with slightly concave sides to lunula, where it is more than two-fifths (0·42) head-width, frontal triangle somewhat embossed, reaching lunula, thinly dusted brown and slightly shining, interfrontalia somewhat narrowed in front, five times as wide at middle as a parafrontale, the latter with 2 moderately strong inclinate setae on less than anterior half and 2 reclinate setae behind, the anterior of which is much the weaker, ocellars and inner verticals strong, outer verticals moderately strong; jowls two-thirds width of third antennal segment, the latter practically reaching mouth-margin; arista short-haired, more than one-third width of third antennal segment, longest hairs about twice as long as its basal width. *Thorax* with the *prsc acr* in about 3 rows, outer rows almost as broadly separated from each other as from *dc*, *prsc* indistinct, anterior *prst dc* half as long as posterior, posterior *ia* moderately strong, anterior one somewhat

weaker; some setulae adjacent to prostigmals, lower *stpl* fine, much closer to posterior than to anterior one. *Abdomen* very short-ovate, apex rounded with a median notch, the hypopygium being narrowly visible in dorsal aspect, fourth ventrite with a deep excision, which is rounded anteriorly and sinuous at sides; lateral marginals conspicuous, fourth segment with a row of rather strong marginals. *Wings* greyish subhyaline with a slight brownish tinge, strongly iridescent; veins brown, r_1 reaching level of *r-m*, which lies towards three-fifths of discal cell, *m* virtually straight in apical section, r_{4+5} straight near tip, both together therefore almost parallel at tip. Calyptrae subhyaline (except for basal outer part of upper one), greyish-white with concolorous border and fringe. *Legs* without submedian setae on anterior tibiae except for the *p* seta of the mid tibia, mid femur with 2–3 *a* setae near middle, 2 rather thin *pv* setae on basal two-fifths and only 1 (*p*) pre-apical; hind femur with 2 rather widely separated *av* pre-apicals, hind tibia with an *ad* seta slightly beyond middle and without an *av*.

Length.—2·3 mm., of wings 2·2 mm.

Distribution.—N.E. BURMA: Kambaiti, 2,000 m., 10.IV.34 (*R. Malaise*), ♂ type (in Mus. Stockholm).

269. **Limnophora** (s. str.) **argentata** sp. n.

(Fig. 136)

♂ ♀: Fuscous-black, head and face moderately densely dusted silver-white, fly otherwise not very densely dusted whitish-grey and brown, upper part of occiput, usually vertex, three more or less fused vittae or most of disc of mesonotum (except shoulders, notopleura, a narrow band along lateral part of suture and the declivitous part in front of scutellum) fuscous with brown dust, abdomen (Fig. 136) with dorsum of first segment almost wholly dark, second and third segments with a pair of triangular dark spots, which are somewhat suffused and wider than long, fourth with an elongate median spot, which is dilated to apex. *Head* with fuscous interfrontalia, which are rather thinly dusted silver, so that they are dark in dorsal and posterior views and silvery in front view, less strongly so in female; eyes virtually bare; frons at vertex almost two-fifths (0·36–0·40) head-width, parallel-sided or moderately widened to lunula where it is two-fifths to one-half (0·39–0·49) head-width, frontal triangle reaching lunula, in male very slightly embossed, in female somewhat more densely dusted, interfrontalia moderately narrowed behind,

strongly in front, 6–7 times as wide at middle as a parafrontale, the latter on anterior two-thirds with 3 or 2 inclinate setae, on upper third with 2 reclinate setae, the anterior of which is slightly smaller, ocellars and inner verticals strong, outer verticals moderately strong; parafacialia more than a third, jowls almost or fully, width of third antennal segment, the latter falling short of mouth-margin by about half its own width; arista pubescent, including hair less than a third width of third antennal segment, longest hairs as long as its basal diameter. *Thorax* with the *acr* in about four rows just in front of suture and in 2–3 behind neck, *prsc* weak, anterior

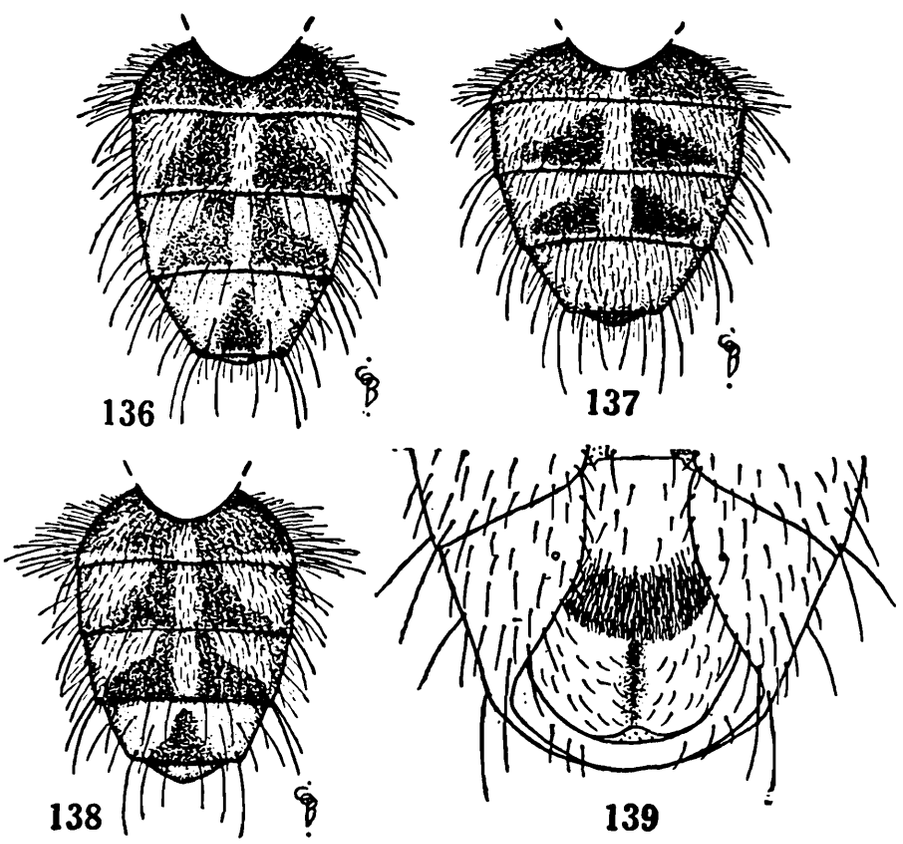


Fig. 136. *Limnophora argentata* sp. n., abdomen of male.

Fig. 137. *Limnophora subplumosa* sp. n., abdomen of male.

Fig. 138. *Limnophora pubiseta* sp. n., abdomen of male.

Fig. 139. *Limnophora plumiseta* Stein, hind end of male abdomen, ventral view.

ia weak or rather weak; some setulose hairs adjacent to prostigmals, lower *stpl* moderately strong, much closer to posterior than to anterior one. *Abdomen* (Fig. 136) ovate, in female pointed, in male rounded at apex, the hypopygium narrowly showing in dorsal view, fourth ventrite strongly convex, the lobes directed more dorsad than caudad, excision deep in caudal view, somewhat sinuous on each side and

angular on median line; second segment with weak lateral discals and strong lateral marginals, third with strong lateral discals and a complete or almost complete marginal row, fourth with a usually incomplete discal row of marginals, which are strong in male and weak in female. *Wings* greyish subhyaline with a slight brownish tinge and with brown veins; r_1 slightly exceeding level of *r-m*, which lies towards three-fifths of discal cell, apical section of *m* almost straight, r_{4+5} very gently curved backward, the two veins thus slightly converging at apex. Calyptrae greyish-white with concolorous border and fringe, lower one opaque. *Legs* without submedian setae on anterior tibiae, except for the *p* seta of the mid tibia (in one male paratype two *p* setae); mid femur with 2–3 erect setulose hairs in basal third of *pv* surface and with 2 *p* pre-apicals; hind femur with (1–)2–3 *av* pre-apicals, hind tibia with an *ad* and *av* seta.

Length.—3·0–4·3 mm., of wings 3·2–4·8 mm.

Distribution.—N.E. BURMA: Kambaiti 2,000 m., 17.V.34 (*R. Malaise*), ♂ type (in Mus. Stockholm), 30.IV–1.VI.34, 13 ♂, 1 ♀ paratypes (in Mus. Stockholm, B.M. and Mus. Helsinki).

By its silver-white-dusted fronto-facial strip, which is of almost equal width above and below but as a rule slightly wider at level of second antennal segment and slightly narrower at lower fourth, this species is rather distinctive, but in the female these characters are less marked, and the fact that it has not been possible to associate more than one female with the series of males must raise the suspicion that the female is often indistinguishable from other species, especially *prominens*.

270. **Limnophora** (s. str.) **subplumosa** sp. n.

(Fig. 137)

♂: Fuscous-black, rather densely dusted pale grey, mesonotum largely fuscous on disc with brown dust, the *prst* dark spot connected with the broad *post* band on median line, pattern thus as in *breviceps*, etc., but *prsc* pale band a little broader and not interrupted on median line by brown dust, apical third of scutellum more or less dusted grey; first abdominal segment (Fig. 137) dark on dorsal surface except for a linear hind margin and a rather narrow median vitta, second and third with paired triangular spots which are much broader than long and which do not quite reach front margin nor lateral surface but which are more or less contiguous with hind

margin, fourth towards base with or without a small oblong brown-dusted median spot. *Head* with silver-white dust on face and parafrontalia, dark brown dust on upper part of occiput and some brown dust on the fuscous-black interfrontalia; eyes almost bare, frons at vertex two-fifths head-width, slightly or not dilated with almost straight sides to lunula where it is more than two-fifths (0·40–0·47) head-width, frontal triangle hardly defined anteriorly, fading out toward lunula, posterior part dusted more densely and, in dorsal view, more greyish, therefore more conspicuous, interfrontalia parallel-sided behind, rather strongly narrowed in anterior half, 3–4 times as wide at middle as a parafrontale, the latter on slightly more than anterior half with (3–)4(–5) inclinate and above with 2 not very strong reclinate setae, outer part with a few proclinate hairs, ocellars and verticals strong; parafacialia almost one-half, jowls almost equal to, width of third antennal segment, the latter falling short of mouth-margin by almost half its own width; arista short-plumose, including plumosity two-thirds width of third antennal segment, longest rays almost one-half this width. *Thorax* with about three irregular longitudinal rows of *prst acr*, *prsc* small (but distinct), anterior *prst dc* considerably shortened, anterior *ia* rather fine, posterior one not much stronger; 2–3 hairs adjacent to the prostigmals, lower *stpl* rather weak, much closer to posterior than to anterior *stpl*, the latter moderately strong. *Abdomen* (Fig. 137) subcircular-subcordate with rounded apex, the hypopygium narrowly showing in dorsal view, fourth ventrite convex, only shallowly emarginate in ventral view, more or less deeply so in posterior view; second segment with distinct, third with moderately strong, lateral marginals, third with distinct and fourth with moderately strong, lateral discals, fourth also with a row of moderately strong marginals. *Wings* greyish subhyaline with brown veins, r_1 distinctly exceeding *r-m*, which lies a little beyond middle of discal cell; *m* very distinctly but very gradually upcurved in last section, markedly converging to tip with r_{4+5}. Calyptrae greyish-white, subopaque, with concolorous border and fringe. *Legs* without submedian setae on anterior tibiae, except for the *p* seta of the mid tibia; mid femur with 2 *a* setae towards middle, an erect *pv* setula at base and 2 *p* pre-apicals; hind femur with 1–2 strong *av* pre-apicals, hind tibia with an *ad* and *av* seta near middle.

Length.—2·6–3·0 mm., of wings 2·8–3·0 mm.

Distribution.—N.E. BURMA: Kambaiti, 2,000 m., 26.IV.34 (*R. Malaise*), ♂ type (in Mus. Stockholm), 18.IV–8.V.34, 4 ♂ paratypes (in Mus. Stockholm, B.M. and Mus. Helsinki).

Three females from the same locality, 8. and 18.IV.34 of 4·3–4·6 mm. length and a wing length of 3·8–4·7 mm., are believed to belong to this species, as they have grey-dusted parafacialia and an elongate median spot on base of fourth tergite. The dark colouration of the mesonotum is less contrasting and much reduced, so that a median vitta and a pair of outer vittae remain, the latter broadly interrupted at suture and more or less fused with median vitta behind suture; scutellum grey-dusted with some dark dust at base, especially on lateral surface. The greater size of the female is probably a regular feature in this group of small males.

271. **Limnophora** (s. str.) **pubiseta** sp. n.

(Fig. 138)

♂: Colouration as in *subplumosa*, but parafrontalia dusted brown, except for outer anterior corner, dark pattern of mesonotum less contrasting and more narrowly (though completely) separated from scutellum, dorsal surface of scutellum wholly dark with brown dust, spots of intermediate abdominal segments (Fig. 138) reaching front margins, and fourth abdominal segment with a large triangular median spot which is narrow at base and wide at apex of segment. *Head:* Eyes almost bare, frons at vertex almost two-fifths (0·37–0·38) head-width, not much dilated with slightly concave sides to lunula where it is two-fifths (0·39–0·41) head-width, frontal triangle and the fuscous-black interfrontalia dusted brown in anterior view, the former therefore poorly defined, fading out towards lunula, interfrontalia markedly narrowed behind and in front, 5–6 times as wide at middle as a parafrontale, the latter on anterior two-fifths with about 4 inclinate and behind with two rather weak reclinate setae, ocellars and verticals rather strong; parafacialia a third, jowls equal to, width of third antennal segment, the latter falling short of mouth-margin by less than half its width; arista pubescent, a quarter width of third antennal segment. *Thorax* suffusedly defining the beginning and hind end of a brown median vitta; setae as in *subplumosa*. *Abdomen* (Fig. 138) ovate, strongly convex, apex rounded, as the hypopygium is somewhat visible in dorsal view, fourth ventrite and setae as in *subplumosa*. *Wings* evenly brownish subhyaline, veins brown; r_1 markedly exceeding level of *r-m*, which lies at or slightly beyond middle of discal cell, *m* very slightly upcurved, somewhat converging to tip with r_{4+5}. Calyptrae greyish-white with concolorous border and fringe, subopaque. *Legs* as in *subplumosa*.

Length.—2·6–3·0 mm., of wings 2·8–3·0 mm.

Distribution.—N.E. BURMA: Kambaiti, 2,000 m., 4.VI.34 (*R. Malaise*), ♂ type (in Mus. Stockholm), 13. and 23.V.34, 2 ♂ paratypes (in B.M. and Mus. Helsinki).

272. **Limnophora** (s. str.) **tinctipennis** Stein.

1910. ! *Limnophora tinctipennis* Stein, *Ann. Mus. nat. Hungar.*, VIII, 557 ♂ ♀ Types: Pattipola. Mus. Budapest.

Fuscous-black with rather dense yellowish-grey dust and a fuscous, dark brown-dusted pattern similar to that of *subplumosa*; intermediate abdominal segments along hind margins with large band-like paired spots, which reach fore margin near median line and extend over lateral surface; fourth segment with a dark median spot, which is widest at middle of its length, at least in female. *Head:* Frons of male at base of antennae almost as wide as an eye; of female slightly wider, more than one-third (0·35) head-width at vertex, considerably dilated with slightly concave sides to lunula, where it is well over two-fifths (0·43–0·44) head-width, parafrontalia dusted brown, except for outer anterior corner, parafacialia dusted golden above, more silver-white below, frontal triangle dusted brown, fading out towards lunula, anterior part dark and inconspicuous, interfrontalia markedly narrowed above and below, five times as wide as a parafrontale, the latter with 3–4 inclinate setae on more than anterior half, ocellars and verticals strong; parafacialia a third, jowls fully, width of third antennal segment, the latter with conspicuous hairs, the longest of which are about a third as long as width of that segment. *Thorax* with the yellowish-grey dust in front of scutellum extending to the last *dc*; *prsc* indistinct, setae otherwise as in *subplumosa*. *Abdomen* ovate with pointed apex in female, elongate ('subconico, fere cylindrico') in male; third segment of male with conspicuous marginals, fourth also with conspicuous setae; in female the anterior three segments with rather strong lateral marginals and weak lateral discals, the marginals of the third segment extending farther towards median line, fourth with a row of rather strong discals and rather weak marginals. *Wings* 'distinctly smoky' (in female subhyaline with a conspicuous brown tinge), veins brown, r_1 reaching or slightly exceeding level of *r-m*, which lies between middle and three-fifths of discal cell, *m* evenly but rather conspicuously upcurved and converging with r_{4+5}. Calyptrae whitish-grey with concolorous border and fringe. *Legs* without submedian setae on

anterior tibiae, except for the *p* seta towards middle of mid tibia; mid femur with 2 small *a* setae towards middle, 2 fine erect setulose hairs in basal third of *pv* surface and 2 *p* pre-apicals; hind femur with 2 *av* pre-apicals, hind tibiae with an *ad* and *av* seta near middle.

Length.—'♂ 4 mm. ♀ 4·5–5 mm.', but actually smaller, the four female paratypes at hand being 3·7–4·1 mm. long with a wing length of 4·1–4·3 mm. (measured with an eyepiece micrometer).

Distribution.—CEYLON (Pattipola; Nanu Oya; Pidrutalagala; Nuwara Eliya; Kandy).

I have not seen the male, and females cannot reliably be distinguished from related species at present. However, female paratypes obtained from the Budapest Museum appear to differ from all the other species at hand, though they are closely related to *subplumosa* Emd. and *pubiseta* Emd. The characters of the male have been taken from Stein's paper, otherwise the above description is based on four female paratypes in the B.M.

273. **Limnophora** (s. str.) **plumiseta** Stein.

(Fig. 139)

1903. *Limnophora plumiseta* Stein, *Mitt. zool. Mus. Berlin*, **II**, 109 (♂ ♀); 1909, *Tjidschr. Ent.*, **LII**, 244, 252; 1910, *Ann. Mus. nat. Hungar.*, **VIII**, 558; 1915, *Suppl. Ent.*, **IV**, 36, 39; 1918, *Ann. Mus. nat. Hungar.*, **XVI**, 155, 174, 196; 1920, *Tijdschr. Ent.*, **LXII**, suppl. 45, 56, 82; Mall., 1928, *Ent. Mitt.*, **XVII**, 293, 295. Types: Cairo; Assiut. Mus. Berlin.

1951. *Limnophora macrophthalma* Emden, *B.M. Ruwenzori Exped.*, **II**, 383, 400. Type: Kampala (Uganda). B.M. n. syn.

Fuscous-black, densely dusted whitish-grey; mesonotum with a pair of *prst* spots, which are fused at neck, but more or less separated behind by suffused pale dust and which reach to about the *prst*, *post* band complete, extending from suture to about last *post dc*, abdomen with the first segment wholly dark on dorsal surface (except often for a short trace of the median vitta near hind margin), second and third with a pair of large dark triangular spots, which reach front margin and are moderately broad, truncated on lateral surface, fourth in male with a broad median spot, in female with a spindle-shaped median vitta. *Head* rather densely dusted silver-grey, interfrontale fuscous-black, with thin brownish-grey dust, upper part of occiput fuscous with brown dust; eyes practically

bare; frons (♂ ♀) at vertex about a third (0·32–0·37) head-width, moderately broadened with somewhat concave sides to lunula where it is two-fifths (0·38–0·41) head-width, frontal triangle moderately shining and only thinly dusted brown in front of ocellars, reaching lunula, interfrontalia somewhat narrowed to extremities, especially anterior one, almost six times as wide at middle as a parafrontale, the latter on anterior three-fifths with 3–4 inclinate and behind with 2 rather short reclinate setae, anterior outer part with several rather conspicuous black proclinate setulae, ocellars strong, verticals rather strong; parafacialia about a third, jowls not quite, as wide as third antennal segment, the latter falling short of mouth-margin by about half its own width, arista plumose, almost as wide as third antennal segment, longest hairs about half as long as width of that segment. *Thorax* with 4 irregular longitudinal rows of *prst acr*, *prsc* small but rather distinct, 2 moderately strong *prst* and 2 weak and 2 strong *post dc*, anterior *ia* more or less weak; lower *stpl* rather weak, much nearer to posterior than to anterior *stpl*. *Abdomen* subcircular to very short ovate, in female pointed, in male rather broadly rounded at apex (Fig. 139), as the large hypopygium is somewhat visible in dorsal aspect, all segments with distinct lateral marginals, second to fourth with weak lateral discals, the marginal row completed by setulose hairs and, on fourth segment, weak setae. *Wings* subhyaline with a very slight brownish tinge; r_1 reaching or slightly exceeding level of *r-m*, which is rather oblique and lies at three-fifths to two-thirds of discal cell, *m* very slightly upcurved towards apex and r_{4+5} very gently curved backward, R_5 thus slightly narrowed at apex. Calyptrae greyish-white, with concolorous border and fringe, lower one subopaque. *Legs* without submedian setae on anterior tibiae except for the 2(–3) *p* setae of the mid tibia; fore femur of male at base with a number of long setulose *v* hairs which are curved towards apex of femur, 2–3 of them much longer and stronger, rest of *v* and *pv* surfaces with very fine erect short hairs, only a few *pv* ones near apex being somewhat stronger and longer; mid femur with 2–3 half-erect curved fine hairs at base, an *a* seta at middle and 2 *p* pre-apicals; hind femur with 1–2 pre-apical *av* setae, hind tibia with an *ad* and *av* seta.

Length.—2·5–3·7 mm., of wings 2·4–3·8 mm.

Distribution.—CEYLON. S. INDIA. N. INDIA (Bihar; Bengal; Assam). N.E. BURMA. MALAYA. Further LIBERIA. GOLD COAST. BELGIAN CONGO. UGANDA. EGYPT. FORMOSA. JAVA. SUMATRA. CERAM. NEW CALEDONIA (1 ♀ det. by Curran in B.M.).

274. **Limnophora** (s. str.) **himalayensis** Brunetti.

(Fig. 140)

1907. *Limnophora himalayensis* Brun., *Rec. Ind. Mus.*, I, 382, ♀; 1908, *Ibid.*, II, 107 (*Spilogaster*). Types: Theog and Dharampur (Simla Distr.). Ind. Mus., Calcutta.

Fuscous-black, densely dusted greyish-white, middle part of parafrontalia with some brown dust, mesonotum with a pair of fuscous, brown-dusted *prst* spots, which as a rule are broadly separated and do not or only just reach second *prst dc*, and a broad *post* band which occupies half of *post* part, scutellum dark as a rule on less than basal half, abdomen with dorsal surface of first segment mostly pale dusted, a pair of round paramedian spots, which are often connected with the dark base, brown, intermediate segments with a pair of large, roundish-triangular fuscous, brown-dusted spots, which approach or reach front margin, and the broadest part of which does not reach lateral surface behind, fourth with a narrow incomplete brown-dusted median vitta. *Head* with practically bare eyes; frons of male about one-tenth head-width, interfrontalia fuscous, linear, parafrontalia very narrow, slightly widened to lunula, with 7–10 rather strong inclinate setae, which extend almost to ocelli, and a proclinate setula at level of anterior ocellus, ocellars weak, verticals very fine and indistinct; frons of female at vertex more than a third (0·34–0·35) head-width, moderately dilated with hardly concave sides to lunula, where it is two-fifths (0·39–0·41) head-width, frontal triangle dark dusted and somewhat shining on anterior third, which fades out towards lunula, otherwise densely whitish-dusted, this part broad and almost circular, interfrontalia slightly narrowed behind, strongly in front, four times as wide at middle as a parafrontale, the latter on anterior three-fifths with 4–5 inclinate setae, ocellars and verticals rather strong; parafacialia more than half as wide, jowls half as wide again, as third antennal segment, the latter falling short of mouth-margin by about its own width, arista plumose, fully as wide as third antennal segment, longest rays more than half that width. *Thorax* with (3–)4 irregular longitudinal rows of *prst acr*, the outer ones more widely separated than from the *dc*, *prsc* small but distinct, *prst* 2 *dc* moderately strong, anterior 2 *post dc* short, last 2 strong, anterior *ia* rather weak; a few hairs adjacent to the prostigmals, posterior *stpl* very weak to indistinct, much nearer to posterior than to anterior *stpl*. *Abdomen* subconical with truncate apex in male, short-ovate with pointed apex in

female, second and third segments with conspicuous lateral marginals and weak or indistinct lateral discals, fourth with a row of strong discals and in male strong, in female weak, marginals. Fourth ventrite of male, *see* Fig. 140. *Wings* greyish subhyaline, hardly tinged brownish; r_1 reaching or somewhat exceeding level of *r-m*, which is markedly oblique, and which lies towards three-fifths or two-thirds of discal cell,

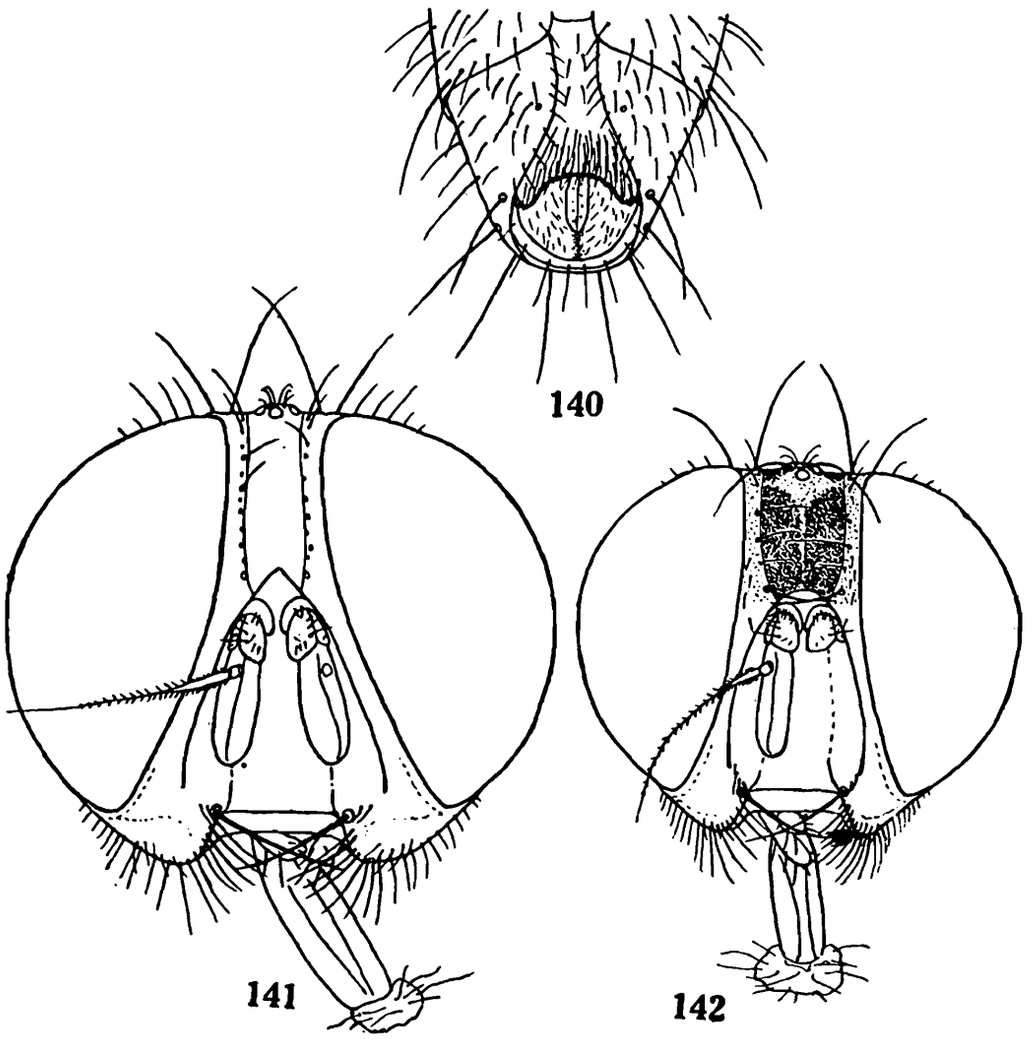


FIG. 140. *Limnophora himalayensis* Brun., hind end of male abdomen, ventral view.

FIG. 141. *Limnophora perakensis* Mall. ♀, head of female.

FIG. 142. *Limnophora apiciseta* sp. n., head of female.

m distinctly (though not strongly) upcurved near tip and slightly sinuous, r_{4+5} very gently curved backward, almost straight near apex. Calyptrae pale brownish to whitish-grey with concolorous border and fringe, lower one subopaque. *Legs* without submedian setae on anterior tibiae except for the 2(–3) *p* setae of the mid tibia; mid femur with an *a* seta towards middle, 2–4 strong (in ♀ weak) *pv* setae on basal

two-fifths, and 2 *p* pre-apicals; hind femur with 2(–3) *av* pre-apicals, hind tibia with an *ad* and *av* seta near middle.

Length.—3·9–4·8 mm., of wings 4·1–4·7 mm.

Distribution.—CEYLON. INDIA (Madras; W Himalayas; Simla Distr. (Himachal Pradesh); United Provinces (Uttar Pradesh); E. Himalayas; Bihar; W Bengal; N. Bengal). N.E. BURMA.

The identification is based on specimens received in 1910 and 1915 from the Indian Museum and E. Brunetti respectively and identified by the latter. They fit Brunetti's brief description and supplementary note, but there are some discrepancies between the specimens and his figures in addition to that concerning the arista corrected in the 1908 note. Fig. 3 is said to show a female, and in fact the typical series is said to be all females, but the head of Fig. 3 looks more like that of a male, the large uniform dark *prst* spot is that of a dark male, and the scutellum is represented as being entirely dark in contradiction to the specimens and Brunetti's description. In view of the latter discrepancy and the mistake about the arista there seems to be every reason for accepting Brunetti's subsequent identification as correct, and considering the figure as inaccurate. The African *L. obsignata* Rond. differs only by somewhat longer rays of the arista and somewhat larger *prst* spots, but in an occasional ORIENTAL specimen the latter are quite as large as in ETHIOPIAN individuals. *L. suturalis* Stein from Formosa and Waigeou also appears to be closely related but has the dark pattern even more extended than *obsignata*.

275. **Limnophora** (s. str.) **malaisei** sp. n.

♂ ♀ : Fuscous-black, rather thinly dusted pale grey, mesonotum with three moderately narrow brown-dusted vittae, which in male are suffused, so that most of disc is dusted greyish-brown, scutellum grey-dusted with brown-dusted dark lateral and dorso-lateral surface, abdomen with the first segment almost wholly dark on dorsal surface, intermediate segments with a pair of strongly transverse triangular dark spots, which reach fore margin on each side of median line and which almost reach lateral surface behind, fourth with a dark median vitta, which reaches hind margin rather broadly. *Head* rather thinly dusted pale grey with some brownish dust on interfrontalia; eyes practically bare; frons at vertex two-fifths (0·39–0·42) head-width, slightly dilated with almost straight sides to lunula where it is 0·43–0·44 times head-width, frontal

triangle poorly defined, fading out towards lunula, interfrontalia slightly narrowed behind, rather conspicuously in front, fully five times as wide at middle as a parafrontale, the latter on anterior half with 3 rather strong inclinate (and on posterior half with 2 reclinate) setae, ocellars and verticals strong; parafacialia at middle a third (but at lower end those of male linear), jowls subequal to, width of third antennal segment, the latter almost reaching mouth-margin; arista pubescent, less than a third width of third antennal segment. *Thorax* with the rows of *prst acr* much more widely separated from the *dc* than from each other, *prsc* and both *ia* distinct but rather short; lower *stpl* weak, much smaller than anterior one and much farther from it than from posterior one. *Abdomen* very short-ovate, in female narrowly truncate, in male rounded-truncate at apex, the hypopygium just affecting the outline, rather large but almost hidden in the fourth segment when viewed laterally, fourth ventrite convex, very broadly and shallowly emarginate at apex; all segments with distinct lateral marginals, third also with weak lateral discals, fourth with an incomplete discal row and a marginal row, setae of the latter rather weak in female. *Wings* subhyaline with brown veins; r_1 reaching level of *r-m*, which lies at or towards three-fifths of discal cell, r_{4+5} very gently curved backward, *m* almost straight in apical section, which is just noticeably and evenly upcurved. Calyptrae greyish-white with concolorous border and fringe, subopaque. *Legs* without submedian setae on anterior tibiae, except for the 2 *p* setae of the mid tibia; mid femur with 2 *a* setae towards middle and 2 *p* pre-apicals, hind femur with an *av* pre-apical, hind tibia with a small *ad* and *av* seta.

Length.—2·5–2·9 mm., of wings 2·4–3·1 mm.

Distribution.—N.E. BURMA: Kambaiti, 2,000 m., 23.V.34 (*R. Malaise*), ♂ type (in Mus. Stockholm), 30.IV.34, 1 ♀ paratype (in B.M.).

276. **Limnophora** (s. str.) **glaucescens** sp. n.

(Pl. 2, fig. 13)

♂ ♀: Fuscous-black, densely dusted pale grey, especially pleurae and underside in places bluish-grey, purplish-grey and greenish-grey, parafrontalia dusted brown, except for anterior outer part, mesonotum with a fuscous brown-dusted median spot from suture to anterior declivity and a pair of *prst* spots from the *dc* to the *ph* and *prst*, this spot usually more or less fused with the median one, scutellum and *post* part wholly

dark except for a dark streak extending more or less far forward from scutellar suture on the line of the *dc* and on anterior boundary of postalar callus, often sending a separate branch forward on the line of the *ia*; first abdominal segment wholly dark on dorsal surface except for a faint pale dusted median vitta and often outer portion of hind margin, intermediate segments with a pair of large triangular dark spots, which reach front margin, in female narrowly extending along it, and which approach or reach outer surface, antero-lateral margin of these dark spots more or less concave, fourth with a median vitta, which in male is usually divided at base by a pale dusted median spot and considerably dilated at apex, and which in female is similar or, more often, reduced to a simple narrow longitudinal streak. *Head* densely dusted whitish-grey to bluish-grey, interfrontalia black, somewhat velvety, with some brownish dust, parafrontalia largely dusted brown; eyes practically bare, in male separated by $\frac{1}{7}$–$\frac{1}{8}$ head-width, frons moderately dilated to vertex and lunula, interfrontalia black, thinly dusted brown, band-shaped, slightly dilated to extremities, 3–4 times as wide at middle as a parafrontale, the latter with 6–8 rather fine inclinate setae and, at level of anterior ocellus, a proclinate setula, ocellars fine and moderately long, verticals fine and hardly differentiated; frons of female more than a third (0·35–0·37) head-width at vertex, moderately dilated with straight or somewhat concave sides to lunula where it is more than two-fifths (0·41–0·45) head-width, frontal triangle poorly defined, somewhat brown-dusted, anterior part slightly shining and narrowly drawn out to lunula, interfrontalia markedly and almost evenly narrowed in front and behind, 4–5 times as wide at middle as a parafrontale, the latter with 4 inclinate setae on anterior three-fifths and some black setulae on outer part; parafacialia half as wide, jowls half as wide again, as third antennal segment, the latter falling short of mouth-margin, which is markedly produced, by more than half its own width; arista pubescent, including hairing hardly a quarter width of third antennal segment. *Thorax* with only two rows of widely spaced fine *prst acr*, *prsc* fine but quite conspicuous, 2+4 strong *dc*, *ia* rather weak but very distinct; lower *stpl* weak, much closer to posterior than to anterior one. *Abdomen* ovate, in female with pointed apex, in male with rounded apex, the hypopygium being narrowly visible in dorsal aspect, fourth ventrite with a deep angular excision; anterior three segments with a row of long marginals, which is more or less interrupted at middle but completed by longer setulose hairs, third also with an incomplete discal row, fourth segment

with a row of long discals and long (♂) or rather small (♀) marginals, hair in male long and erect towards sides, first genital segment with a row of long setulose hairs. *Wings* greyish subhyaline with brown veins, setulae on dorsal surface of r_{4+5} reaching or approaching *r-m*, the latter level with apex of r_1 and at two-thirds or three-fifths of discal cell, apical section of *m* virtually straight, r_{4+5} evenly and gently curved backward. Calyptrae greyish-white with concolorous border and fringe, or the border somewhat yellowish. *Legs* without submedian setae on anterior tibiae except for the 2(–3) *p* setae of mid tibia; mid femur with 1–2 *a* setae towards middle, 2 *p* pre-apicals and in male a *pv* row of fine curved setae, in female without *v* setae (except for the usual long setula at base); hind femur of male with a row of fine *av* and *pv* setae, the *av* ones smaller towards base, where they are sometimes reduced to setulae, the *pv* ones smaller towards apex, of female with 1–4 *av* setae towards apex, hind tibia with an *ad* and *av* seta near middle.

Length.—4·2–5·1 mm., of wings 4·2–5·2 mm.

Distribution.—N.E. BURMA: Kambaiti, 2,000 m., 25.IV.34 (*R. Malaise*), ♂ type (in Mus. Stockholm), 18.IV–4.VI.34, 4 ♂, 18 ♀ paratypes (in Mus. Stockholm, B.M. and Mus. Helsinki) (in addition 1 ♂, 2 ♀, 7 V–11.VI.34, in which only the base of r_{4+5} is setulose). INDIA: Phagu, 9,000 ft., Simla Hills, 18–21.V.16 (*Annandale* and *Kemp*), 1 ♂, 1 ♀ paratypes (in Ind. Mus., Calcutta); Darjeeling, 6,000 ft., 1.X.08 (*Brunetti*), 1 ♀ paratype (in Ind. Mus., Calcutta); Valley of R. Sutlej below Simla, W. Himalayas, 6.V.10 (*Annandale*), 1 ♀ paratype (in Ind. Mus., Calcutta). S. INDIA: Shembaganur nr. Kodaikanal, 6,000 ft., 30.III.36 (*B.M.-C.M. Exped.*), 1 ♀ paratype (in B.M.); Kodaikanal, 7,000 ft., 26.III.36 (*B.M.-C.M. Exped.*), 1 ♀ paratype (in Colombo Mus.). MALAYA: Gunong Tahan Padang, 5,550 ft., Pahang, 12.XII.22 (*H. M. Pendlebury*), 1 ♂ with darker calyptrae and without a head (in B.M.).

L. breviventris Stein will probably be traced to *glaucescens* in the key, but it is slightly smaller (male 3·5–4 mm.), and the eyes of the male are more broadly separated, the frons being parallel-sided.

277. **Limnophora** (s. str.) **perakensis** Malloch.

(Fig. 141)

1929. *Limnophora perakensis* Mall., *J.F.M.S. Mus.*, XIV, 455, ♀ (♂ ?). Type: Batang Padang. Lost (eaten; empty pin returned to B.M.).

Head black, interfrontalia velvety, deep black, orbits greyish dusted, almost silvery at anterior extremities, face, cheeks, and occiput, grey dusted, the latter fuscous above; antennae and palpi black. Thorax black, dorsum dark brown, with two faint presutural vittae just mesad of the dorsocentrals, the lateral margins from humeri to wing bases, and an oblique streak over each postalar callus, grey dusted; pleura bluish-grey dusted, with a faint brown mark below base of wing which suffuses hind portion of mesopleura; scutellum black-brown. Abdomen coloured as thorax, with the usual paired blackish dorsal spots on visible tergites one to three inclusive, fasciform, wide centrally, tapered off laterally, and not separated in middle, fourth tergite with an elongated dark central mark, the other portions of tergites densely hyaline, veins dark brown. Calyptrae yellowish-white. Halteres yellow.

Frons at anterior ocellus not over twice as wide as third antennal segment and about one-eighth as wide as head, a pair of fine backwardly curved hairs almost in line with anterior ocellus, and a series of incurved hairs from these to anterior margin, becoming longer anteriorly, orbits linear; ocellar bristles weak; arista pubescent; face slightly carinate above; cheek a little higher than width of third antennal segment, vibrissal angle hardly produced. *Thorax* with 2+4 dorsocentrals, a pair of prescutellar acrostichals, and the presutural acrostichal hairs in four rather irregular series, the outer hairs about as far from the dorsocentrals as they are from each other transversely. Fourth visible abdominal tergite with a number of irregularly arranged erect bristles on disc which are as long as those at apex. Fore tibia without a median posterior bristle; mid femur with two or three long posteroventral bristles on basal half, and one or two anterior bristles near middle; mid tibia with two posterior bristles; hind femur with a complete series of rather widely spaced anteroventral bristles; hind tibia with one anteroventral and one anterodorsal bristle. Inner cross-vein of wing about two-fifths from apex of discal cell; fourth vein very slightly bent forward at apex, the setulae on base extending about midway to inner cross-vein.

Length.—6·5 mm.

Type: Perak, Batang Padang, Jor Camp, 1,800 feet, 21.I.25 (*H. M. Pendlebury*).

Two females and one male from Sumatra appear to belong to this species or one very closely similar to it.

Distribution.—MALAYA. ? SUMATRA (Malloch, 1929). ? INDIA: Simla Hills, 5,000 ft.

The above is Malloch's original description. No specimens entirely agreeing with it are available, but a female from Simla in the Indian Museum is probably conspecific. It differs only by two (instead of one) small reclinate setae at level of anterior ocellus, the frons almost one-sixth head-width (Fig. 141), the spots of the intermediate abdominal segments separated by a grey-dusted median vitta though tending to coalesce along hind margins, the fourth segment and mesopleura unspotted, the scutellum wholly dusted grey, and the setulose hairs on r_{4+5} extending over hardly a quarter of the distance to *r-m*. (The specimen has lost its mid and hind legs).

278. **Limnophora** (s. str.) **apiciseta** sp. n.

(Fig. 142)

♂ ♀: Fuscous-black with pale grey (♀) or greyish-brown (♂) dust and an extended dark brown-dusted pattern, mesonotum and scutellum dark except for shoulders, notopleura, a narrow sutural band, which is interrupted on median line, and a faint or vestigial spot on each side between last *dc* and scutellar suture, abdomen dark except for a grey-dusted median vitta on intermediate segments, and on the same segments a grey-dusted tongue on each side, which extends from lateral surface about half-way to median line and which lies nearer to anterior than to posterior margin, fourth segment similar (♂) or with a broad dark median vitta and a narrow dark basal margin, otherwise dusted greyish (♀). *Head* (Fig. 142) with thickly brown-dusted frontal triangle and parafrontalia, and thinly brown-dusted occiput and interfrontalia, the latter otherwise black, rest brownish-grey; eyes almost bare; frons a quarter to almost three-tenths (0·25–0·29) head-width at vertex, parallel-sided or very slightly dilated to lunula, where it is about three-tenths (0·27–0·31) head-width, frontal triangle reaching middle, but its tip drawn out into a somewhat shining line which fades out towards lunula, interfrontalia gradually and very slightly narrowed to extremities, 4–6 times as wide at middle as a parafrontale, the latter on anterior three-fifths with 3–4 inclinate and posteriorly with 2 reclinate setae, ocellars and verticals rather strong; parafacialia linear, especially in male, jowls in male somewhat narrower than, in female as wide as, third antennal segment, the latter falling short of mouth-margin by less (♂)

or more (♀) than half its own width; arista rather sparsely short-pubescent, longest hairs hardly as long as its basal diameter. *Thorax* with 2–3 longitudinal rows of *prst acr*, outer rows less widely separated from each other than from the *dc*, *prsc* fine but distinct, anterior *prst* and anterior 2 *post dc* moderately shortened, both *ia* rather weak but distinct, lower *stpl* much weaker than anterior one and much closer to posterior than to anterior one. *Abdomen* short-ovate with rounded-truncate (♂) or pointed (♀) apex, in male hypopygium very narrowly visible in dorsal aspect, fourth ventrite with a broad obtuse, somewhat sinuous excision anterior three segments with conspicuous lateral marginals, fourth with a row of strong discals and marginals, the latter in female often weak. *Wings* subhyaline with a very slight brownish tinge, veins brown; r_1 reaching or slightly passing level of *r-m*, which lies towards three-fifths of discal cell, r_{4+5} usually with only 1 dorsal and 1–2 ventral setulae at base, moderately curved back in apical section, *m* slightly and more or less evenly upcurved in apical section. Calyptrae brownish-grey with paler base, border yellowish near base, brown near apex, fringe pale golden. *Legs* without submedian setae on anterior tibiae except for the 2 (in the only remaining mid tibia of the type only 1) *p* of the mid tibia; mid femur with 1–2 *a* setae towards middle, 2 *p* pre-apicals and a strong erect *pv* seta near basal third in addition to a long setulose *v* hair at base; hind femur with 2–3 *av* pre-apicals, hind tibia with an *ad* and a small *av* seta.

Length.—3·5–4·9 mm., of wing 3·5–4·6 mm.

Distribution.—N.E. BURMA: Kambaiti, 2,000 m., 23.V.34 (*R. Malaise*), ♂ type (in Mus. Stockholm), 18.IV–17.VI.34, 10 ♀ paratypes (in Mus. Stockholm, B.M. and Mus. Helsinki). N. INDIA: 25 miles S.W of Sadiya, Assam, 13.III.44 (*D. E. Hardy*), 1 ♂ paratype; Darjeeling, 6,000 ft., 28–29.IX.08, sweeping grass and low herbage (*E. Brunetti*), 3 ♀ paratypes (in Ind. Mus., Calcutta, and B.M.).

Apparently similar and related to the Sumatran *L. fuscana* Mall., which can be distinguished by dark dusted shoulders and a row of rather widely spaced *av* setae on the hind femora. I have seen three females of a very similar form (a subspecies?) from Formosa and Ceylon, in which the pale dusted area of the abdomen is more extended, so that the lateral tongues approach, or coalesce with, the median vitta, the *prst acr* are arranged in four rows, the outer ones being as distant from each other as from the *dc*, the lateral discals undifferentiated on the intermediate abdominal segments and the *av* seta of the hind tibia absent.

279. **Limnophora** (s. str.) **virago** sp. n.

(Fig. 143)

♂ ♀: Fuscous-black with pale grey and brown dust, scutellum and mesonotum as in *apiciseta*, but the pale dust in front of scutellum all brown and usually not divided by a darker median vitta (divided and more grey in the Assam specimen), abdomen in male densely, in female thinly dusted pale grey, first segment dark except for lateral posterior part, intermediate segments in male each with a pair of strongly contrasting subtriangular (trapezoidal) spots, which reach fore margin rather broadly, and which extend posteriorly, tapering out on upper part of lateral surface, fourth segment with a broad dark median vitta; pattern of female similar but suffused and not contrasting, pale dusted median vitta of intermediate segments absent, in most directions the abdomen thus appearing almost wholly dark brassy-brown. *Head* with more or less brown-dusted parafrontalia (largely grey-dusted in Assam specimen) and occiput, face dusted brownish-grey, antennae dusted brownish, interfrontalia black; eyes almost bare, in male contiguous (Selangor) or subcontiguous (Assam), separated by $\frac{1}{18}$–$\frac{1}{40}$ head-width, in female (Fig. 143) subcontiguous, separated by $\frac{1}{10}$ head-width, frons slightly widened to vertex, somewhat more to lunula, frontal triangle small, interfrontalia band-shaped (♀) or linear to obsolete (♂), slightly widened to lunula, parafrontalia linear, slightly widened below, on the whole length with 6–7 pairs of inclinate setae which decrease in length posteriorly, especially in male, and 2 proclinate setulae, ocellars and verticals rather weak but quite distinct; parafacialia linear, jowls about as wide as third antennal segment, the latter falling short of mouth-margin by about half its own width; arista rather sparsely short-pubescent, longest hairs hardly as long as basal diameter. *Thorax* with the *prst acr* in 3–4 longitudinal rows, the outer ones somewhat less widely separated from each other than from the *dc*, *prsc* and posterior *ia* moderately strong, anterior *ia* weak, anterior *prst* and anterior two *post dc* moderately strong; lower *stpl* slightly (♀) or much (♂) weaker than anterior, from which it is more distant than from posterior one. *Abdomen* ovate with pointed apex (♀) or oblong-ovate with rounded apex with median notch (♂), hypopygium narrowly visible in dorsal aspect, terminal truncature subcircular in caudal view, fourth ventrite somewhat convex, with a broadly obtuse

rather shallow apical excision and moderately broad prominent rounded lobes; anterior two segments with conspicuous lateral marginals, second and third with small lateral discals, third and fourth with a marginal row, fourth in addition with a discal row of setae. *Wings* subhyaline with a conspicuous brown tinge, especially anteriorly, veins brown; r_1 reaching or very slightly exceeding level of *r-m*, the latter beyond middle or three-fifths of discal cell, r_{4+5} almost evenly curved backward in its apical section, *m* somewhat upcurved at tip

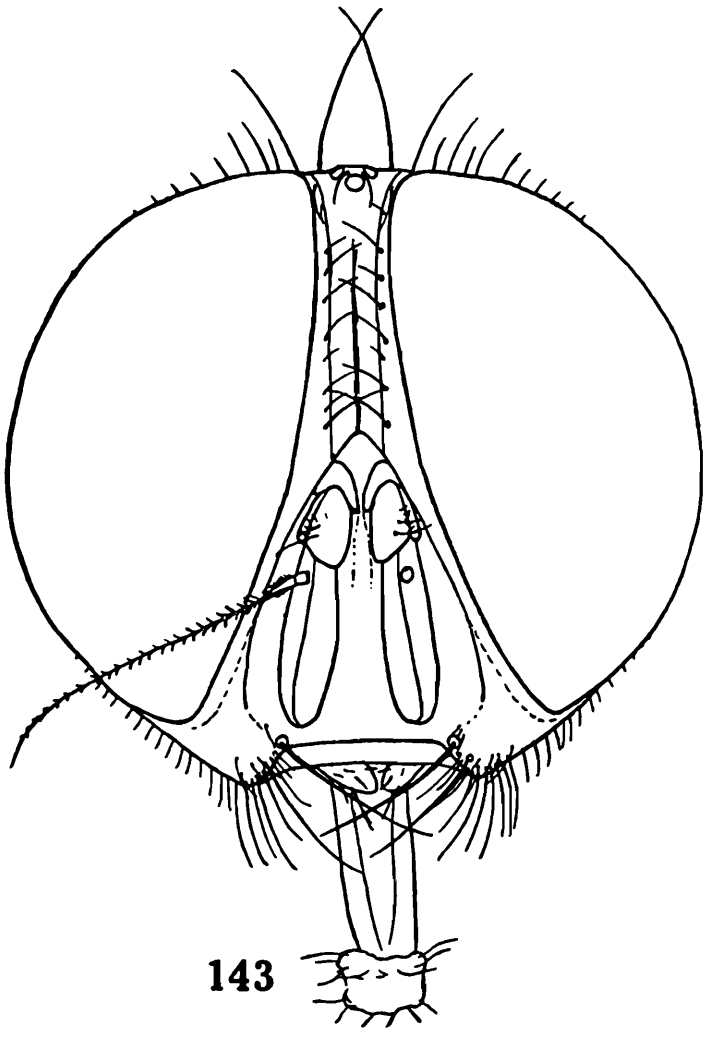


FIG. 143. *Limnophora virago* sp. n., head of female type.

where these veins converge conspicuously. Calyptrae pale brownish-grey with concolorous border and pale golden fringe. *Legs:* Fore tibia of female with 1, mid tibia of both sexes with 2, rather strong *p* setae; mid femur with 2–3 *a* setae towards middle, 2 *p* pre-apicals and 3–4 strong *pv* setae in about basal half; hind femur with á complete row of 5–7 strong *av* setae, hind tibia with a rather strong *ad* and *av* seta near middle.

Length.—5·2–6·1 mm., of wings 5·1–5·5 mm.

Distribution.—MALAYA: Kedah Peak, 3,900 ft., 28.III.28 (*H. M. Pendlebury*), ♀ type, 2 ♀ paratypes (one badly eaten); Selangor-Pahang, near Gentung Sembak Hill, 11.IX.26 (*C. Dover*), 1 ♂ paratype (all in B.M.). N. INDIA: 25 miles S.W of Sadiya, Assam, 13.III.44 (*D. E. Hardy*), 2 ♂ paratypes (in U.S. Nat. Mus. and B.M.).

It is somewhat doubtful, if the three males are conspecific and indeed if one of them is the typical male of the present species, which is mainly based on the female. However, the males are much more closely related to the females of *virago* than to any other species at hand, so that they can belong to the typical form or to subspecies or to very closely related new species. Moreover, one of the Sadiya paratypes has 2 *p* setae on both mid tibiae, the other on both of them only one.

In the narrowness of the female frons, the *av* setae of the hind femur and the dark median spot of the fourth tergite this species is very similar to *perakensis* Mall., but the presence of a *p* seta on the fore tibia of the female in addition to the proclinate setula of the frons preclude it from being identified as Malloch's species. *L. innocua* Mall. and *appropinquans* Stein both have the eyes of the male only subcontiguous; in the former the fore tibia has no *p* seta in either sex, in the latter this seta is present in both sexes. Moreover, the mid femur in *appropinquans* has five strong *pv* setae from base to beyond middle.

280. **Limnophora** (s. str.) **conica** Stein.

1915. *Limnophora conica* Stein, *Suppl. ent.*, **IV**, 30, 38; 1918, *Ann. Mus. nat. Hungar.*, **XVI**, 155; 1920, *Tijdschr. Ent.*, **LXII**, suppl., 55; Mall., 1928, *Ent. Mitt.*, **XVII**, 293, 295; Karl, 1935, *Arb. morph. taxon. Ent.*, **II**, 43. Types: Chip-Chip; Tappani; Hoozan; Java. Deutsch. Ent. Inst. and Mus. Amsterdam.

Fuscous-black with rather dense whitish-grey or yellowish-grey dust and a fuscous, brown-dusted pattern (*see* key), scutellum usually with some greyish-brown or grey dust at tip, abdomen with the first segment wholly dark dorsally except for a linear pale dusted hind-margin and a narrow or vestigial median vitta, intermediate segments with a pair of large, triangular, narrowly separated fuscous spots, which almost (♂) or broadly (♀) reach front margin and lateral surface and which in male are markedly rounded off in front and laterally, fourth with a broad dark median vitta (in

female thus only a narrow median vitta and small antero-lateral triangles on the intermediate segments and the outer parts of the fourth segment dusted pale. *Head* dusted silver-white and whitish-grey, parafrontalia of male with some brownish dust on posterior half, of female brown-dusted with grey- or golden-grey-dusted anterior extremity; eyes virtually bare, in male contiguous at middle, interfrontalia obsolescent at middle, visible as a minute black elongate triangle behind and as a moderately small triangle in anterior third, parafrontalia perfectly linear behind, gradually slightly broadened in anterior half, where 4–6 rather strong inclinate setae are present but are followed by a wide bare gap, behind which a pair of proclinate minute setulae is found at level of anterior ocellus, ocellars weak, verticals fine and short, but rather distinct; frons of female at vertex a third (0·33–0·34) head-width, slightly dilated with almost straight sides to lunula where it is well under two-fifths (0·34–0·38) head-width, frontal triangle thinly dusted brown or greyish-brown, fading out near lunula, interfrontalia black, slightly narrowed to extremities, four times as wide at middle as a parafrontale, the latter with 3–4 strong inclinate setae on anterior two-fifths and with a few minute proclinate setulae to their outer side, ocellars and verticals strong, the latter not very long; parafacialia hardly a third, jowls about equal to, width of third antennal segment, the latter falling short of mouth-margin by half its own width; arista plumose, longest rays one-half to two-thirds as long as width of third antennal segment. *Thorax* anteriorly with 2, towards centre with 3–4, longitudinal rows of *prst acr*, the outer ones less widely separated from each other than from the *dc*, *prsc* moderately strong, very conspicuous, anterior *prst* and anterior two *post dc* slightly shortened, both *ia* conspicuous, moderately strong; lower *stpl* weaker than anterior one, much more distant from this than from posterior one. *Abdomen* short-ovate with pointed apex in female, ovate or subconical with rounded apex in male, hypopygium narrowly visible in dorsal aspect, fourth ventrite broadly exposed, convex, middle third of apical margin occupied by a broadly rounded excision, outer third forming a slight broadly rounded lobe; in female all segments with lateral marginals and discals, which become stronger posteriorly, fourth with a row of rather weak marginals, in male lateral surface with long erect setulose hairs, anterior two segments with strong lateral marginals, which on second extend rather far towards median line, third and fourth with a row of strong marginals, fourth also with an interrupted row of strong discals. *Wings* greyish subhyaline,

in male very slightly smoky, veins brown; r_1 somewhat exceeding level of *r-m*, which lies at almost three-fifths to two-thirds of length of discal cell, r_{4+5} gently and evenly curved backward, *m* somewhat upcurved at apex and just noticeably sinuous. Lower calyptra whitish-grey, subopaque, more or less browned or infuscated towards apex, especially in the Malayan specimens, border smoky-yellowish to dark brown, fringe golden to dark brown. *Legs* without submedian setae on anterior tibiae, except for the *p* seta of the mid tibia; mid femur with a rather strong *a* seta towards middle, 2 *p* pre-apicals and, in male, 2 *pv* setae near base; hind femur with a few erect hairs at base of *p* surface and (1–)2 *av* setae near apex, hind tibia with an *av* and *ad* seta.

Length.—4·1–5·0 mm., of wings 4·4–4·9 mm.

Distribution.—FORMOSA. JAVA. MALAYA. N.E. BURMA. N. SIAM.

Sbg. **Heliographa** Malloch.

The setulae on the apical section of the dorsal surface of r_1 which distinguish this subgenus from *Limnophora* s. str. are very small and decumbent, but the species differ from those of *Limnophora* s. str. also by a *Gymnodia*-like appearance, being stouter and provided with a more contrasting black and white pattern. The ventrobasal scale is bare or finely setulose. The prosternum is setulose, the opposite being the case in *Gymnodia*.

Distribution.—AUSTRALIAN, ORIENTAL and ETHIOPIAN REGIONS.

Biology.—Unknown.

281. **Limnophora (Heliographa) insignis** Stein.

(Fig. 144)

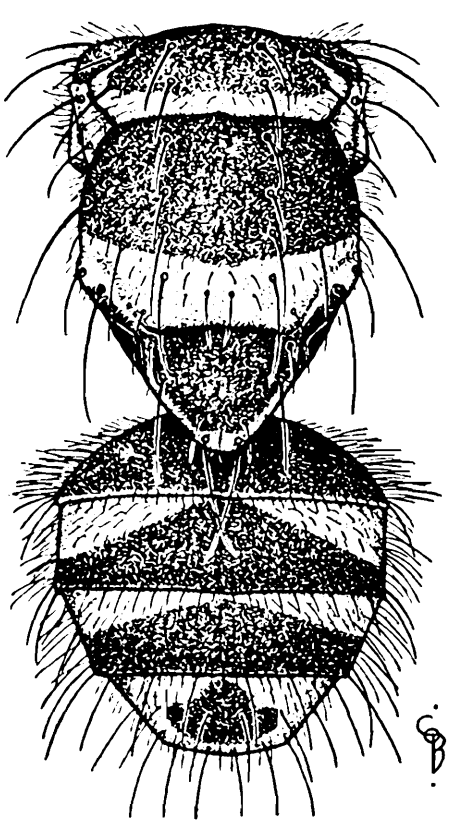
1900. *Spilogona insignis* Stein, *Ann. Mus. civ. St. n. Genova*, **XX**, 390. Type: Moroka (N. Guinea). Mus. Genova.

1915. *Limnophora insignis* (Stein), Stein, *Suppl. ent.*, **IV**, 37; 1918, *Ann. Mus. n. Hungar.*, **XVI**, 155; 1920, *Tijdschr. Ent.*, **LXII**, suppl., 45; Karl, 1935, *Arb. morph. taxon. Ent.*, **II**, 43.

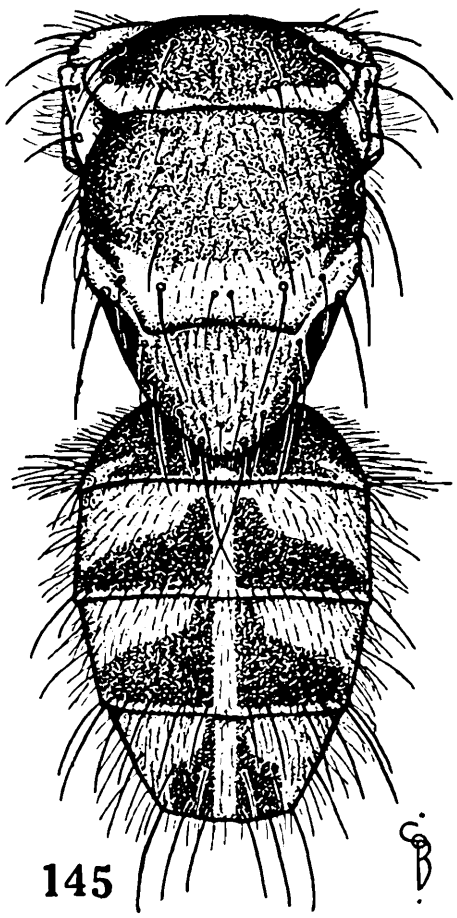
1925. *Heliographa insignis* (Stein), Mall., *Philipp. J. Sci.*, **XXVI**, 508; 1929, *J.F.M.S. Mus.*, **XIV**, 454, 455.

Densely dusted pale yellowish-grey or whitish-grey with a well defined black brown-dusted pattern (Fig. 144); *prst* spot large with almost evenly curved hind margin, which is indented only to inner side of shoulders, and, very slightly or not at all, to inner side of second *prst dc*, and which extends to

hind margin of shoulder callosity, *prst* and second *prst dc*; *post* band broad with almost straight fore and evenly curved hind margin, the latter running through the posterior *ia* but not quite reaching the last *dc*; abdomen with first segment wholly black, except for a perfectly linear pale hind margin, with a broad dark band, which almost or quite reaches front margin at middle and lateral and ventral surfaces behind (in about posterior half), the dark spot (in fresh specimens and posterior view probably always) divided by a narrow median



144



145

FIG. 144. *Limnophora* (*Heliographa*) *insignis* Stein, thorax and abdomen of male.

FIG. 145. *Limnophora* (*Heliographa*) *ceylanica* sp. n., thorax and abdomen of male.

vitta of pale dust, fourth with a large lozenge-shaped dark median spot, which reaches at most fore margin, and which is (usually, if not always) divided by a pale dusted median vitta. *Head* dusted brownish-grey and pale grey with brown-dusted parafrontalia; eyes bare, in male closely contiguous, interfrontalia obsolete except for a small triangular anterior fifth, parafrontalia perfectly linear, anterior fourth somewhat broadened and with 3–4 moderately strong and 1–2 setulose

inclinate setae, ocellars small, verticals very small and fine but rather distinct; frons of female at vertex three-tenths (0·29–0·32) head-width, not or slightly dilated with almost straight sides to lunula, where it is 0·29–0·34 times head-width, frontal triangle poorly defined, brown-dusted like posterior part of interfrontalia, indistinctly reaching lunula, interfrontalia slightly narrowed behind, rather conspicuously so in front, five times as wide at middle as a parafrontale, the latter with 3–4 strong inclinate setae on slightly more than anterior half, ocellars and verticals strong; parafacialia in lateral view obsolescent near middle, in anterior view $\frac{1}{3}$, jowls two-thirds, width of third antennal segment, the latter falling short of mouth-margin by almost its own width; arista plumose, the hairs becoming slowly shorter from basal third onwards, longest hairs four-fifths as long as third antennal segment is wide. *Thorax* with very fine *acr* hairs arranged in 5–6 longitudinal rows just in front of suture, *prsc* not strong but very distinct, subequal to second *ia*, first *ia* weak or (♂ only ?) absent, 1+1 *stpl*, the posterior one much stronger. *Abdomen* (Fig. 144) subcordate, in female pointed at apex, in male rather broadly truncate, hypopygium not visible in dorsal aspect, fourth ventrite broad, convex, apex with a very broad and shallow subtruncate excision and narrow short rounded lobes; male with long erect hair, especially laterally, marginals of anterior two segments fine and largely indistinct, lateral discals of third segment distinct in female, marginal row weak in female, conspicuous in male, fourth segment with more or less distinct lateral discals and a row of marginals, which are rather strong in male but weak in female. *Wings* greyish subhyaline with brown veins, apical section of r_1 with some small black setulae on dorsal surface, base of r_{4+5} with a short row of black setulae on dorsal and ventral surfaces; r_1 distinctly exceeding level of *r-m*, the latter near two-thirds of discal cell, r_{4+5} very slightly and evenly curved backward, *m* markedly upcurved at apex, R_5 therefore conspicuously narrowed at tip. Lower calyptra opaque, yellowish-grey, apical half including border and fringe infuscated in male. *Legs* slender, without submedian setae on anterior tibiae, except for the *p* seta of mid tibia; mid femur with an *a* seta near middle, 2 *p* pre-apicals and, in female, a single long setulose hair at base, in male 2–4 *pv* setae on basal two-fifths; hind femur with only a strong *av* pre-apical (in addition to the *ad* row and *d* pre-apical), hind tibia with an *ad* and *av* seta.

Length.—3·9–4·8 mm., of wings 4·1–5·1 mm.

Distribution.—S. INDIA (Coimbatore District). MALAYA

(Pahang; Perak). SUMATRA (Simalur Is.). FORMOSA. NEW GUINEA.

Limnophora ochribasis Emd. (1951, *B.M. Ruwenzori Exp.*, **II**, 386, 425) from Uganda, Kenya and Liberia is closely related by the plumose arista and bare underside of the scutellum. It differs from *insignis* by the presence of a small lower *stpl* and the pattern, the *prst* dark spot covering at most anterior part of shoulders and, at least in male, reaching the *post* band on median line, the base of the abdomen being more extensively pale, and the fourth segment having an undivided and smaller median spot. *Rheamyia alutia* Séguy (1950, *Mém. Inst. franç. Afrique noire* 10, p. 281) from the Aïr area in the Sahara has densely haired subcontiguous eyes but appears to belong to the same group of species.

282. **Limnophora (Heliographa) ceylanica** sp. n.

(Fig. 145)

♂ ♀ : Fuscous-black, densely dusted greyish-white with an extended black, brown-dusted pattern (Fig. 145); *prst* spot reaching the *ph*, *prst* and posterior *prst dc* and narrowly connected on median line with the *post* band; the latter contiguous with suture, reaching last *dc*, second *ia*, anterior extremity of postalar callosity, and extending along outer part of the latter and over all the scutellum; abdomen with a complete narrow pale dusted median vitta and pale dusted anterior triangles, the apices of which reach or almost reach the median vitta in male but remain rather broadly separated from the median vitta in female, the border between the pale dusted and dark triangles somewhat sinuous in male, almost straight in female, the dark triangles reaching lateral surface along hind margin narrowly (♂) or rather broadly (♀). *Head* rather densely dusted greyish-white, parafacialia and parafrontalia (in ♀ only outer anterior part) densely dusted silver-white; eyes practically bare, in male subcontiguous, interfrontalia perfectly linear to lunula, only hindmost part slightly widened, forming a minute elongate-triangular pit in front of ocelli, parafrontalia linear, gradually but markedly broadened in anterior half where 1 small inclinate seta and 4–5 setulae are present, ocellars weak, verticals rather indistinct; frons of female almost three-tenths (0·29) head-width at vertex, very slightly dilated with somewhat concave sides to lunula, where it is about a third (0·30–0·34) head-width, frontal triangle poorly defined, rather

shining, fading out at lunula, interfrontalia narrowed anteriorly to hardly more than half their greatest width, which lies at two-fifths of their length from vertex and which is five times as great as the smallest width of a parafrontale, the latter broadened anteriorly to fully width of interfrontalia, with 3–5 moderately strong inclinate setae on anterior three-fifths and with an irregularly double row of black setulae to their outer side, ocellars and verticals strong; parafacialia in lateral view more than a third, jowls equal to, width of third antennal segment, the latter falling short of mouth-margin by more than half its own width; arista short-plumose, more than half as wide as third antennal segment, rays slowly becoming shorter on apical third, longest rays almost half as long as width of third antennal segment. *Thorax* with the *acr* hairs small, arranged in 5–6 longitudinal rows and confined before suture to the strip between the paramedian glabrous vittae, *prsc*, second *ia* and *stpl* as in *insignis*, first *ia* absent. *Abdomen* of male (Fig. 145) subovate with truncate apex, of female subcordate with bluntly pointed apex, hypopygium not or hardly visible in dorsal aspect, fourth ventrite as in *insignis*, but the lobes rather broad and truncate at apex; hair in male rather long and erect, especially laterally, lateral marginals of anterior three segments well developed to conspicuous, third segment in female also with rather weak lateral discals, fourth with distinct (♀) or indistinct (♂) lateral discals and a row of weak (♀) or moderately strong (♂) marginals. *Wings* greyish subhyaline, in male somewhat smoky, with dark brown veins; apical section of r_1 with small setulae on dorsal surface, base of r_{4+5} with a few rather long setulae on dorsal and ventral surfaces; r_1 reaching or slightly exceeding level of *r-m*, which lies at about three-fifths of discal cell; r_{4+5} slightly and evenly curved backward, *m* similarly upcurved, R_5 therefore markedly narrowed to tip. Lower calyptra opaque, greyish-white with yellowish border, in male smoky towards margin, fringe pale golden. *Legs* slender, the anterior tibiae and mid femur as in *insignis*, but mid femur of male with only 1–2 *pv* setae near base; hind legs as in *insignis*.

Length.—4·4–5·4 mm., of wings 4·4–5·3 mm.

Distribution.—CEYLON: Belihul Oya, 11.II.54 (*F Keiser*), ♂ type (in Mus. Basle), 5 ♂, 1 ♀ paratypes (in Mus. Basle and B.M.); Kandy, Hantana, 14.X.53 (*F Keiser*), 1 ♂ paratype (in Mus. Basle); Kandy, Deiyannewela, 2.XI.53 (*F Keiser*), 1 ♂ paratype (in B.M.); Akurana, 19.I.54 (*F Keiser*), 1 ♀ paratype (in Mus. Basle).

283. Limnophora (Heliographa) tonsa Stein.

1851. ? *Hydrotaea javana* Macq., *Dipt. exot.*, suppl. 4, 262 (= *Mém. Soc. Sci., Lille,* 1850, 235). Type: Java. Coll. Collin, Newmarket. n. syn.

1909. *Limnophora tonsa* Stein, *Tijdschr. Ent.*, **LII**, 244, 245, ♂, ? ♀; 1915, *Suppl. ent.*, **IV**, 36, 38; 1918, *Ann. Mus. n. Hungar.*, **XVI**, 156; 1920, *Tijdschr. Ent.*, **LXII**, suppl. 56, 73; Karl, 1935, *Arb. morph. taxon. Ent.*, **II**, 43. Type: Tankoeban Prahoe (Java). Mus. Amsterdam.

1921. *Heliographa tonsa* (Stein), Mall., *Ann. Mag. n. H.* (9), **VII**, 169 (*intonsa* lapsu cal.); 1922, *Ibid.* (9), **X**, 574; 1925, *Philipp. J. Sci.*, **XXVI**, 508; 1929, *J.F.M.S. Mus.*, **XIV**, 454; 1929, *Treubia*, **VII**, 399; Hennig, 1952, *Beitr. Ent.*, **II**, 73.

Fuscous-black, densely dusted greyish-white with an extended well-defined brown-dusted black pattern; *prst* spot of mesonotum occupying the whole of the shoulders, thus only notopleurae and a narrow interrupted band along suture and a rather narrow curved band in front of postalar callosities and scutellum dusted pale, the dark *post* band reaching second *ia*, last *dc* and more or less *prsc* (in the only available female extended on median line to base of scutellum); abdomen of female uniformly dark with brown dust or as in male: In male first segment suffusedly pale dusted on anterior dorsal part, intermediate segments with a large paired dark spot, which reaches fore and hind margins near median line but quickly recedes to anterior third, the fore margin then running in a gentle convex curve to posterior third or fourth of dorsolateral surface, pale dusted median vitta rather narrow, parallel-sided, fourth segment with a large dark median spot, which is narrow at base, and broad at apex of segment and which in posterior view is traversed by a continuation of the pale dusted median vitta. *Head* dusted whitish-grey with brown-dusted parafrontalia and in female thinly brown-dusted interfrontalia and frontal triangle; eyes practically bare, in male closely contiguous, interfrontalia almost entirely obsolete, parafrontalia perfectly linear, slightly broadened in anterior third, where one moderately strong and about six very fine inclinate setae are present, behind a long gap a pair of proclinate setulae near level of anterior ocellus, ocellars rather fine, verticals very fine and small but distinguishable; frons of female three-tenths head-width, parallel-sided, frontal triangle brown-dusted, more thinly so anteriorly, somewhat shining, fading out at lunula, interfrontalia very thinly dusted brown-grey, somewhat narrowed behind, rather strongly so in front, at middle 4–5 times as wide as a parafrontale, the latter on just over anterior half with 6 inclinate setae, 3 of which are weak or

very weak, and to their outer side with a row of black proclinate setulae, ocellars and verticals strong; parafacialia in lateral view linear at middle, in anterior view one-third, jowls one-and-one-third as wide as third antennal segment, the latter falling short of mouth-margin by half its own width or more; arista with very short hairs on basal half, otherwise practically bare. *Thorax* with the *prst acr* arranged in about 6 longitudinal rows, the outer ones almost twice as widely separated from each other as from the *dc*, *prsc* and posterior *ia* rather small but very distinct, anterior *ia* absent, lower *stpl* very distinct, finer but hardly shorter than anterior one, much closer to posterior *stpl*. *Abdomen* subcircular, subcordate to very shortly ovate, apex narrowly (♀) or rather broadly (♂) truncate, hypopygium not visible in dorsal aspect, fourth ventrite broadly exposed with a moderately broad and moderately deep truncate excision and moderately broad truncate lobes; hair rather long and in male erect on lateral surface, anterior three segments with several strong, in female less conspicuous, lateral marginals, fourth with lateral discals and a row of moderately strong (♂) or weak (♀) marginals. *Wings* greyish subhyaline with a slight brownish tinge and brown veins, r_1 and *r-m* as in *insignis*, r_{4+5} with a few setulae on basal node, r_{4+5} slightly and evenly curved backwards, *m* rather strongly upcurved and distinctly sinuous at apex, reminiscent of *Stomoxys*. Lower calyptra whitish-grey subopaque, apical half conspicuously browned, border and fringe concolorous. *Legs* slender, anterior tibiae without submedian setae except for the *p* seta of the mid tibia; mid femur with an *a* seta towards middle, 2 *p* pre-apicals, and 1 (♀) or 2–3 (♂) *pv* setae near base; hind femur with 1–3 *av* pre-apicals and 1 or 2 *d* pre-apicals, hind tibia with a small *ad* and *av* seta near middle.

Length.—5·4–6·4 mm., of wings 5·3–6·1 mm.

Distribution.—N.E. India (Darjeeling District; Khasia Hills). Malaya (Pahang; Perak). Siam. Formosa. Sumatra. Java. Flores. Buru.

The type of *Hydrotaea javana* Macq., which Mr. J. E. Collin has kindly enabled me to study, is a teneral male (not a female as stated by Macquart) of a *Heliographa*. The head has entirely collapsed, and the whole mesonotum is covered with glue. What can still be seen of the pattern, together with the wing venation, especially the shape of R_5, makes it highly probable that *javana* and *tonsa* are identical. However, an element of uncertainty remains, and in so strongly teneral a specimen even the male genitalia would hardly supply a definite proof. Therefore it is necessary to retain

the name *tonsa* and to list *javana* as a doubtful synonym. It is obvious from Macquart's description that in 1850 the type was exactly in its present condition, so that Macquart should never have described it. The name is missing from Séguy's catalogue (1937, *Gen. Ins. Muscidae*).

Genus 38. **Spilogona** Schnabl and Dziedzicki.

1911. *Spilogona* S. & D., *Nova Acta Leop. Carol. Ak.*, **XCV**, 141, 152; Collin, 1921, *Ent. mon. Mag.* (3), **VII**, 97, 98, 162; Séguy, 1923, *Fne. France, Anthom.*, 196, 205; Karl, 1928, *Tierw. Deutschl.*, 13, *Muscidae*, 92; Huckett, 1932, *J.N.Y. ent. Soc.*, **XL**, 56; Emden, 1951, *B.M. Ruwenzori Exped.*, **II**, 380, 445. Genotype: *compuncta* Wied.

Head considerably less than twice as high as long, both anterior part of frons and vibrissal angle somewhat prominent in lateral view; occiput setulose behind postocular row; arista plumose in Oriental species; frons without proclinate orbital and cruciate interfrontal setae, in females and dichoptic males with two reclinate setae on posterior part, the second of which is the stronger. *Thorax* as a rule with 2 *prst dc* and without a *pra*; prosternum, propleural depression and pteropleura bare; 1+2 *stpl.* *Abdomen* of normal Phaoniine type; ventrobasal scale without a fringe of setulae (but sometimes with a pair of setulae on ventral surface). *Wings* with or without a few small setulae on basal node of r_{4+5}, r_1 bare; *sc* sinuous beyond *h*, apical sector rather suddenly upcurved to costa; sixth vein not reaching margin; transverse veins without dark spots. Lower calyptra of *Phaonia*-type. Halteres pale in the known Oriental species. *Legs:* Mid femur without an *a* pre-apical, with 2 *p* pre-apicals; hind tibia without or with an *ad* pre-apical, which is not longer than tibial diameter.

Grey-dusted flies which are somewhat intermediate between *Limnophora* and the Mydaeini, some of them having the arista long-plumose, or the *ad* pre-apical of the hind tibia distinct (though more or less short) and the thoracic vittae paired.

Distribution.—Widely distributed in the HOLARCTIC, ETHIOPIAN and ORIENTAL REGIONS and in NEW ZEALAND. The South American species separated by Malloch under the name *Lispoides* are hardly more than a species group of the present genus, which thus appears to be unknown only from the Australian and Madagascan subregions.

Biology of the Oriental forms unknown. European species are found in both the adult and larval stages near water

and in humid places, the older larvae being presumably carnivorous.

Key to the Species of Spilogona

1 (2) 3 *post dc.* Mid tibia with 2 *p* setae. Parafacialia, node at base of r_{4+5} and ventrobasal scale without any setulae. Abdomen (Fig. 146) fuscous in ground-colour; mesonotum with 3 strongly suffused brown vittae (Fig. 146) on brown-grey dusted ground, in male mostly dark. Arista long-plumose, longest rays longer than width of third antennal segment. *dimorpha* sp. n., p. 612

2 (1) 4 *post dc.*

3 (4) Mid tibia with 2 *p* setae. Parafacialia and node at base of r_{4+5} without any setulae. Abdomen fuscous. *m* straight in apical part.* Mesonotum with 4 dark vittae (Fig. 148). Hind tibia with 3 widely spaced *ad* setae (♂).† Longest hairs of arista slightly longer than width of third antennal segment. .. . *heliniformis* sp. n., p. 615

4 (3) Mid tibia with only 1 *p* seta. Parafacialia with an irregularly double row of small hairs on their entire length. Node at base of r_{4+5} with some small setulae on dorsal and ventral surfaces. Base of abdomen pale translucent. Mesonotum with three broad confluent dark vittae. Longest rays of arista more than twice as long as width of third antennal segment.. *abnormis* (Stein), p. 616

284. **Spilogona dimorpha** sp. n.

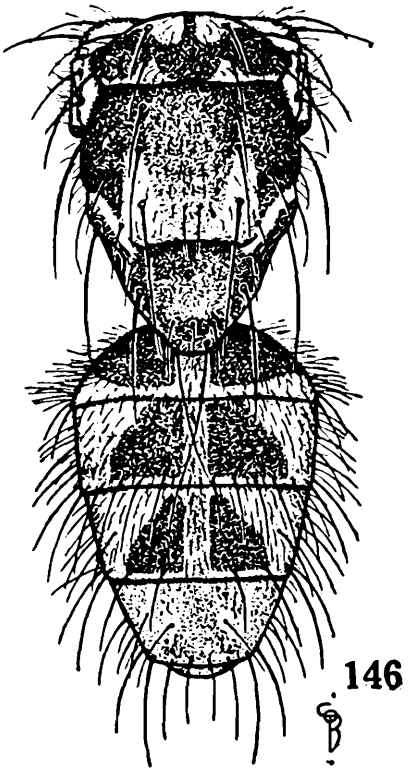
(Figs. 146, 147)

♂ ♀ : Fuscous-black with pale grey and brownish-grey dust, mesonotum in female with three suffused brown-dusted

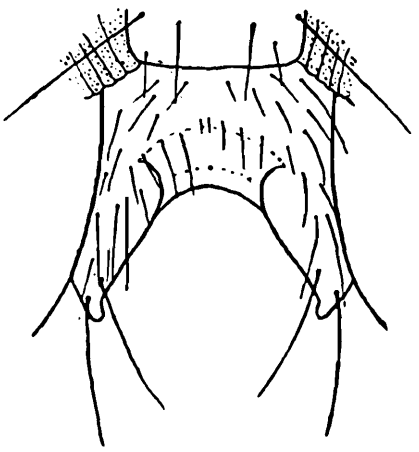
* If *m* is conspicuously upcurved and the arista very short-haired, see *Gymnodia parascendens* Hennig (p. 633), in which the ventrobasal scale is sometimes bare.

† Hind tibia with only 1 short *ad* seta near middle. Abdomen without paired spots; thoracic vittae inconspicuous; see *Hebecnema*, some species of which may easily be traced to *Spilogona*, as the *a* pre-apical of the mid femur is very small.

vittae, the median one rather narrow, the outer ones beginning just mediad to the *dc* and extending to the *prst* but behind suture not reaching the *ia*, in male (Fig. 146) the vittae almost undusted and broadly fused, so that the disc is fuscous apart from traces of paler dust, shoulders and notopleurae dusted pale grey with a narrow band extending along suture almost to median line, in front of scutellum some greyish-brown dust, which extends forward in indefinite streaks; abdomen (Fig. 146) thickly dusted pale brownish-grey with a narrow faint suffused brown median vitta and, on intermediate segments, a pair of rather broadly separated subtriangular fuscous spots.



146



147

FIG. 146. *Spilogona dimorpha* sp. n., thorax and abdomen of male.
FIG. 147. *Spilogona dimorpha* sp. n., fourth (fifth) ventrite of male.

Head densely dusted pale grey with some greenish reflections and dark shifting spots, in dorsal view parafacialia and parafrontalia of male dusted silver-white, the parafrontalia somewhat brownish behind, in female dust more golden-grey and on parafrontalia pale greyish-brown; eyes almost bare, in male separated by $\frac{1}{8}$–$\frac{1}{10}$ head-width, interfrontalia black, conspicuous in their entire length, slightly broadened behind, moderately so below, parafrontalia almost linear behind, somewhat broadened in anterior half, with 6–7 inclinate setae, which become weaker to almost level of anterior ocellus, and which alternate in some places with setulae, ocellars

rather fine, verticals very fine but quite distinct; frons of female at vertex almost one-third (0·31–0·32) head-width, strongly dilated with slightly concave sides to lunula, where it is more than two-fifths (0·42–0·43) head-width, frontal triangle conspicuously dusted pale greyish-brown, elongate, reaching lunula, interfrontalia gradually slightly narrowed to hind end, more suddenly narrowed in front, four times as wide at middle as a parafrontale, the latter on anterior three-fifths with 4 strong (and between them 1–2 hair-like) inclinate setae and, to their outer side, an irregular row of proclinate black setulae, ocellars and verticals strong; parafacialia more than half as wide again as third antennal segment. The latter falling short of mouth-margin by hardly half its own width; arista long-plumose, rays unusually erect, the dorsal ones even somewhat recurved, becoming slowly shorter in apical third (♂) or half (♀), longest rays $\frac{1}{3}$–$\frac{1}{4}$ longer than width of third antennal segment. *Thorax* with 6–8 rows of *prst acr*, which occupy the whole width between the *dc* rows, though the hairs are very sparse on outer thirds of this area, *prsc* moderately strong, 2+3 strong *dc*, both *ia* rather strong; lower *stpl* weaker than anterior one and less close to it than to posterior one. *Abdomen* oblong-ovate with rounded (♂) or narrowly truncate apex (♀), first genital segment of male rather broadly visible in dorsal aspect, fourth ventrite very broad, with a shallow broad median emargination, which is filled out by a broad membraneous border, and broad oblique lobes, the bases of which project, so as to be level with apical margin of membraneous part, and the apices of which are produced into a small glossy-piceous lobe; anterior two segments with some strong lateral marginals, second and third with conspicuous lateral discals, third and fourth with a row of strong marginals, fourth also with one of strong discals. *Wings* greyish subhyaline with dark brown veins, which are bare; r_1 almost or fully reaching level of *r-m*, which lies near three-fifths or two-thirds of discal cell; r_{4+5} and *m* very gently curved backward, not converging, the lateral almost straight. Calyptrae greyish-white, somewhat ochraceous towards margin and on border, fringe pale golden. *Legs:* Fore tibia with a *p* seta; mid femur with 2 *p* pre-apicals and often 2–3 long *pv* hairs, mid tibia with 2 *p* setae; hind femur near base with 3–6 longer setulose hairs and in apical half with 3–4 *av* setae, which become stronger towards apex, hind tibia with a *pd* seta at middle, 2 *ad* and (2–)3 *av* setae.

Length.— ♂ 4·5–5·3 mm., of wings 4·4–5·2 mm. ♀ 4·9–5·6 mm., of wings 5·2–6·2 mm.

Distribution.—N.E. BURMA: Kambaiti, 2,000 m., 25.IV.34 (*R. Malaise*), ♂ type (in Mus. Stockholm), 8.IV–4.VI.34, 15 ♂, 15 ♀ paratypes (in Mus. Stockholm, B.M. and Mus. Helsinki).

Limnophora cylindrica Stein (1915, 1920) is apparently similar and seems to belong to *Spilogona*. According to Stein's description (1920) only three *dc*—though in the key (1915) he attributed 4 *dc* to *cylindrica*—are present, as in *dimorpha*, but the hairs of the arista are very short, the fore tibia is without a *p* seta and the abdomen without triangular spots.

285. **Spilogona heliniformis** sp. n.

(Fig. 148)

♂: Fuscous-black with moderately dense whitish dust, mesonotum with 6 incomplete undusted vittae, which are bordered with some brown dust, scutellum with base and disc

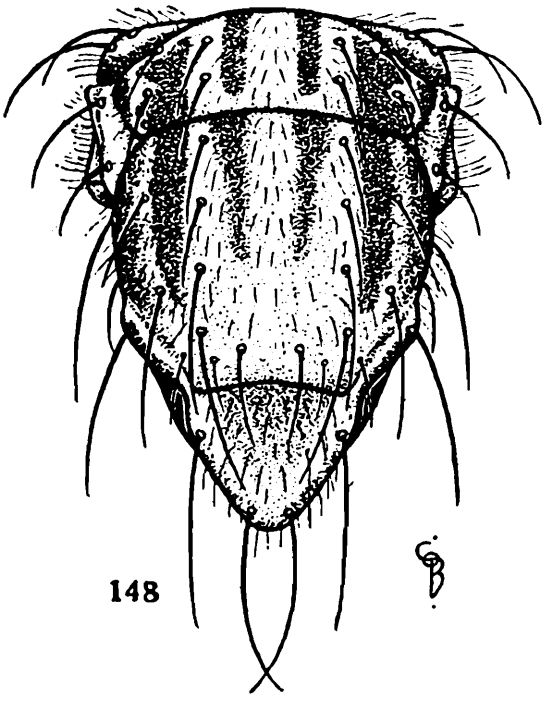


FIG. 148. *Spilogona heliniformis* sp. n., thorax of male.

dusted brown, abdomen with some whitish dust and apparently large rounded dark spots on intermediate segments. *Head* rather thinly dusted whitish-grey, facial ridges rather broad, with brown-golden dust except near vibrissae, parafacialia and parafrontalia in dorsal view silver-white; eyes almost bare, contiguous, interfrontalia obsolete in upper half, forming a. moderately broad triangle in lower half, ocellar

tubercle rather large and somewhat swollen, parafrontalia linear in posterior half, moderately broadened in anterior half where 6 inclinate setae, the alternating ones very weak, are present, ocellars apparently weak, verticals very fine and small, hardly differentiated; parafacialia evenly narrowed in lateral view, linear at level of apex of antennae, jowls hardly wider than third antennal segment, the latter falling short of mouth-margin by almost its own width; arista plumose, rays rather quickly decreasing in length from second fifth onwards, apical sixth almost bare, longest rays one-sixth longer than width of third antennal segment. *Thorax* with the *prst acr* in 4 rows on the median white-dusted vitta and another sparse row on the border between the dark paramedian vittae and the pale vitta on which the *dc* lie, *prsc* apparently absent, 2+4 strong *dc*, both *ia* well developed, *pra* absent, lower *stpl* well developed, closer to posterior than to anterior *stpl*. *Abdomen* elongate-ovate with rounded apex, the first genital segment being somewhat visible in dorsal aspect, fourth ventrite convex and conspicuously prominent in lateral view with a rather deep triangular apical excision and rather long lobes; hairs long and erect laterally, anterior two segments with some strong lateral marginals, third and fourth with a row of strong marginals, fourth also with a strong discal row. *Wings* greyish subhyaline with light brown veins, r_1 somewhat exceeding level of *r-m*, which lies well beyond middle of discal cell, r_{4+5} and *m* as in *dimorpha*. Calyptrae apparently whitish-grey with concolorous border and fringe. *Legs:* Fore tibia without a *p* seta; mid femur without an *a* and with 2 *p* pre-apicals, *pv* surface with 2 strong setae in basal third, mid tibia with 2 *p* setae; hind femur with 4–5 strong and long *av* setae on apical half, hind tibia with 3 *ad* setae situated in a row of erect setulose *ad* hairs and with 2 *av* setae, basal part of *av* surface and the *pd* surface with some semi-decumbent setulose hairs.

Length.—5·4 mm., of wings 4·9 mm.

Distribution.—N.E. BURMA: Kambaiti, 2,000 m., 8.V.34. (*R. Malaise*), ♂ type (in Mus. Stockholm).

The abdomen and calyptrae of the type are strongly greasy.

286. **Spilogona abnormis** (Stein).

1910. ! *Limnophora abnormis* Stein, *Ann. Mus. nat. Hungar.*, VIII, 559. Type: Singapore. Mus. Budapest.

Fuscous with pale cinereous-grey and dark brown dust, the basal 2–3 abdominal segments translucent testaceous, especially on ventral surface; mesonotum with three broad

confluent dark brown vittae, which leave grey only a pair of wedge-shaped paramedian spots from neck almost to suture (in posterior view traceable to second *post dc*), the shoulders, the area outside the *prst*, the wing base, the postalar calli and a wedge-shaped spot from these along the outer side of the *ia* to suture; pleurae grey-dusted with some darker grey reflections; scutellum dark brown with the lateral and apical margins narrowly grey; second and third abdominal segments brown on dorsal surface with grey-dusted vestiges of a median vitta, especially near hind margins, and a wedge-shaped spot extending from lateral surface not more than half-way towards median line even on third segment; fourth dusted grey with a pair of paramedian vittae, which form a lyre-shaped figure; tip of second antennal segment and of palpi narrowly but conspicuously pale ferruginous, tibiae testaceous, metatarsi largely testaceous, rest of tarsi infuscate. *Head:* Interfrontalia dull black with thin brownish-grey dust, frontal triangle and more than upper $\frac{2}{3}$ of parafrontalia dusted brown, face, jowls and occiput with the exception of a fuscous half-ring on upper half, which is contiguous with the occipital row, dusted whitish-grey; frons almost one-third head-width at vertex, conspicuously dilated to lunula; facial profile much longer than frontal one, straight, the face being rather flattened, vibrissal angles only slightly produced; frontal triangle reaching lunula, interfrontalia at middle 6–7 times as wide as a parafrontale, the latter with 4 inclinate (the anterior two more widely separated) setae and an irregularly double row of proclinate setulose hairs; parafacialia almost as wide as third antennal segment with an irregularly double row of small hairs extending over their whole length, jowls at lower extremity of eyes as wide as third antennal segment, the latter over four times as long as wide and falling short of mouth-margin by almost its own width; arista long-plumose, the longest rays more than twice as long as diameter of third antennal segment. Occiput very slightly convex with 2–3 rows of black setulae behind the eyes. *Thorax* with about 8 rows of *acr* hairs before suture; *prsc* fine; only 1 pair of weak *prst dc* close to suture, 4 *post dc*, the first two weak and only the last one strong; 2 well-developed *ia*, the anterior one, however, rather weak, *pra* replaced by two somewhat stronger setulae, the other normally developed. Lower *stpl* somewhat closer to posterior than to anterior one. *Abdomen* subcircular-subcordate, anterior three segments without distinct discals and marginals, fourth with a row of rather strong erect and conspicuous discals and marginals, each row consisting of 2–3 pairs. *Wings* greyish subhyaline; r_1 slightly

exceeding level of *r-m*, the latter beyond middle of discal cell; node at base of r_{4+5} with several small setulae on dorsal and ventral surfaces, r_{4+5} and *m* very slightly converging at apex, *m* being almost unnoticeably raised towards tip. Calyptrae yellowish-grey with whitish-yellow border and fringe. *Legs:* Fore tibia without a submedian seta; mid femur with a rather strong *a* seta basad of middle, without an *a* but with 2 strong *p* pre-apicals, mid tibia with a strong *p* seta at middle; hind femur with 2–3 *av* on about apical half, only the last of them rather strong; *pd* and *ad* pre-apical distinct, hind tibia with an *ad* at middle and an *av* not much beyond it, without a distinct *ad* pre-apical.

Length.—5·5 mm.

Distribution.—MALAYA (Singapore).

Only the female type is known, and the above description is based on it, the male having never been described. The species is well named, for it will be abnormal, in whichever genus or group of genera it is placed. The general appearance, absence of an *ad* pre-apical from the hind tibia and of an *a* pre-apical from the mid femur, and the (virtual) absence of a *pra* are Limnophorine features, whilst the long-plumose arista is a Mydaeine character. However, in the latter group the species would fall in or near *Mydaea* and not, like other transitional forms, in *Helina*. The wholly setulose parafacialia are also an unusual feature.

Genus 39. **Anaclysta** Brauer and Bergenstamm.

1894. *Anaclysta* B. & B. *Denkschr. math. nat. Cl. Ak. Wiss. Wien*, **LXI**, 622; Stein, 1919, *Arch. Naturg.*, **LXXXIII**, A 1, 90, 138; Mall., 1923, *Proc. Linn. Soc. N.S.W.*, **XLVIII**, 601; Curran, 1937, *Amer. Mus. Novit.*, 931, 13; Emden, 1939, *B.M. Ruwenzori Exp.*, **II**, 52. Genotype: *A. eremophila* B.B.

Head holoptic in male, dichoptic in female; ocellars and inclinate frontal setae well developed though not very long, cruciate interfrontal setae absent, parafacialia bare outwards of the inclinate setae; male without distinct verticals, female with short but strong verticals and with a long frontal triangle which is entirely and densely pale dusted; facial ridges bare apart from a few setulae close to vibrissae, the latter hardly above mouth-margin but much above level of lowest part of jowls and markedly above level of lower eye margins. Arista bare. *Thorax* with 1–2+1 *acr*, 2+4 *dc*, 0+1 or 1+2 *ia*, 3 humerals, 1 posthumeral, 1 *prst*, 2 *npl*, without a *pra*, with 1 *sa* and 3 postalars (the innermost off the postalar callosity);

propleural, prostigmal and anterior mesopleural distinct, 1+2 *stpl* arranged in a triangle with an obtuse angle of about 100°; prosternum, propleural depression, pteropleura, hypopleura, suprasquamal ridge and postalar declivity bare, supraspiracular convexity with somewhat longer pile. Scutellum with four pairs of marginals, the first and third short, apical pair cruciate, lateral and ventral surfaces bare. *Abdomen* ovate, in male somewhat truncate, in female pointed at apex, without strong setae, third segment with weak lateral marginals, fourth with a transverse row of weak discals and of weak marginals; male hypopygium small and not projecting. *Wings* (Fig. 150) with wholly haired membrane, all veins (except costa) bare, *m* broadly but strongly rounded forward, R_5 therefore not or hardly wider at apex than at *r-m*, which is somewhat more oblique and longer than usual; subcostal sclerite without setulae; lower calyptra of *Musca* type, without setulae on disc. *Legs:* Mid femur with 2 *p* and without an *a* pre-apical, mid tibia with a strong *v* seta beyond middle and a smaller *p* somewhat basad; hind tibia with a small *ad* and two *av* setae, without a *pd*.

Distribution.—ETHIOPIAN REGION. EGYPT. C. ASIA. INDIA.

Biology.—Larvae in cow-dung on pastures, especially on well-irrigated land (Zimin, 1948, *Opred. Faune S.S.S.R.*, **28**, 64), predacious on coprophagous larvae, especially of the genus *Musca*. The eggs, which are laid singly, have flanges, and the slits of the posterior spiracles (Fig. 11*r*) are short and straight as in *Gymnodia* and many other Phaoniinae. When hatching from the egg the larva is in its second stage (Muirhead Thomson, 1947, *Proc. R. ent. Soc. Lond.* (A), **XXII**, 98, Figs. 22–24).

287. **Anaclysta flexa** (Wiedemann).

(Figs. 50, 149, 150)

1830. *Anthomyia flexa* Wied., *Aussereur. zweifl. Ins.*, **II**, 434. Types: Tranquebar. Mus. Copenhagen and Vienna.

1919. *Anaclysta flexa* (Wied.), Stein, *Arch. Naturg.*, **LXXXIII**, A 1, 138; Muirh. Thoms., 1947, *Proc. R. ent. Soc. Lond.*, (A), **XXII**, 98; Emden, 1951, *B.M. Ruwenzori Exp.*, **II**, 488.

Very densely dusted greyish-golden, in places with a greenish tinge, three vittae (Fig. 149) along the lines of the *dc* and *acr* tending to appear more intensively golden. *Head:* Eyes virtually bare, in male separated by about a twentieth head-width, interfrontalia obsolete except towards lunula,

parafrontalia somewhat raised to median line, with 6–7 moderately strong inclinate setae on somewhat more than anterior half, silver-dusted like the parafacialia; in female separated by almost a third head-width at vertex and almost two-fifths head-width at lunula, frontal triangle elongate, almost or fully reaching lunula, the interfrontalia therefore appearing as two narrow wedge-shaped dark rufous or fuscous vittae on

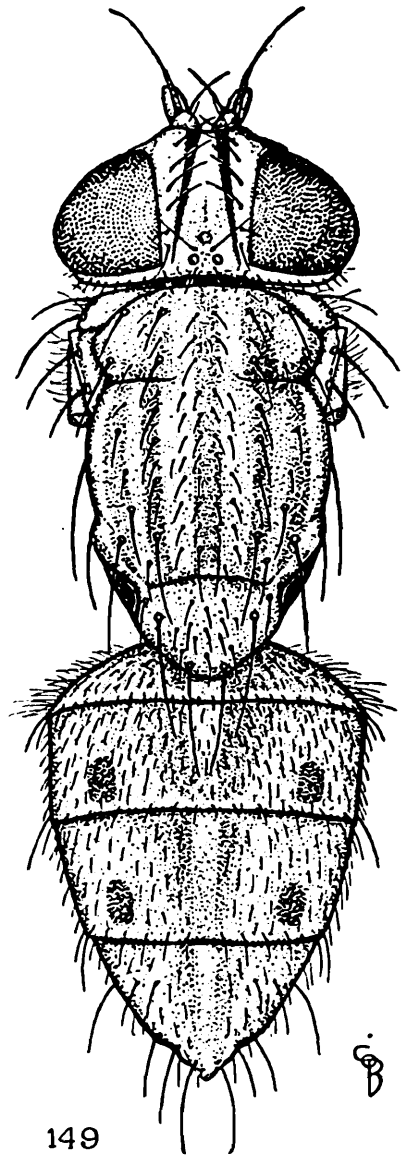


FIG. 149. *Anaclysta flexa* (Wied.), ♀, wings and legs omitted.

the otherwise evenly golden-dusted frons, parafrontalia twice as wide in front as behind, as wide at middle as interfrontalia (including frontal triangle), with 3–5 inclinate and 2 small reclinate setae, the anterior reclinate very small. Palpi and antennae orange-yellow. *Thorax* bare on the strip between the *prst acr* and *prst dc* of each side, but with some setulae in line with the *acr* and *dc* and without or with single setulae

between the two rows of *acr*, hairs more numerous behind suture where there are 4(–6) irregular rows of *acr* hairs between the rows of *dc*. *Abdomen* pale testaceous, each segment with a small roundish brown or fuscous spot near each hind angle, these spots smaller and sometimes indistinct on first and fourth segments. *Wings* hyaline with pale testaceous veins; *r-m* almost at two-thirds of discal cell, separated from *m-m* by not more than length of latter; epaulet pale testaceous, basicosta creamy-white. Lower calyptra brownish-grey, especially in male, with whitish border and fringe. Halteres pale yellowish. *Legs* pale testaceous with strongly infuscated tarsi and apex of fore tibia, in male coxae and fore femora often fuscous; fore tibia without submedian setae.

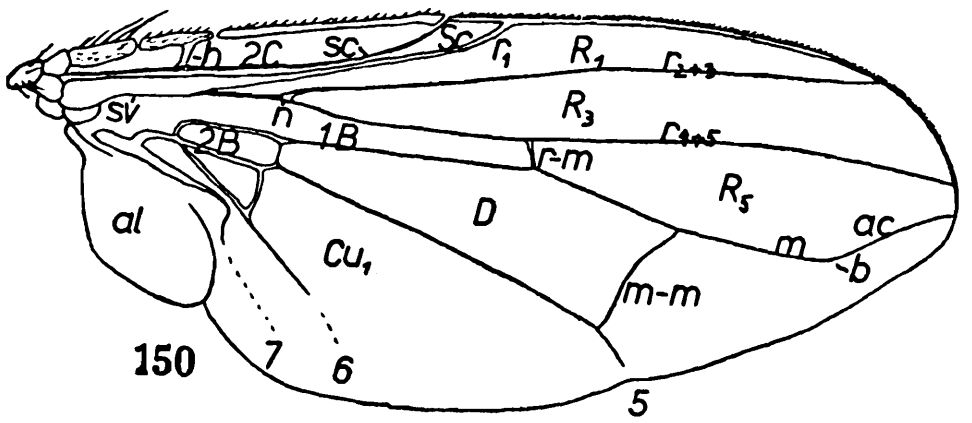


FIG. 150. Anaclysta flexa (Wied.), wing.

Length.—4·3–4·7 mm., of wings 3·9–4·2 mm.

Distribution.—S. INDIA (Coimbatore; Biligirirangan Hills). N. INDIA (Benares, U.P. (Uttar Pradesh)). ASSAM. Oriental males are not at hand, but females are indistinguishable from specimens from the ETHIOPIAN REGION (GOLD COAST; KENYA; SUDAN).

The Benares paratype of *A. ruficornis* Mall. proves to be this species, but it is probable that the type and paratypes from Queensland belong to a different species.

Genus 40. **Gymnodia** Robineau-Desvoidy.

1863. *Gymnodia* R.-D., *Hist. nat. Dipt.*, **II**, 635; Collin, 1921, *Ent. mon. Mag.* (3), **VII**, 96, 98, 99, 239; Huckett, 1932, *J.N.Y. ent. Soc.*, **XL**, 52 (full references); Mall., 1934, *Dipt. Patagonia*, **VII**, 280, 300; Séguy, 1937, *Gen. Ins.* 205, Muscidae, 240, 251, 252, 257, 373; Emden, 1951, *B.M. Ruwenzori Exp., 1934-35*, **II**, 380, 468. Genotype: (*pratensis* R.-D. =) *polystigma* Meig.

1873. *Brontaea* Kow., *Verh. z. b. Ges. Wien.*, **XXIII**, 461. Genotype: *polystigma* Meig.

1920. *Eulimnophora* Mall., *Trans. Amer. ent. Soc.*, **XLVI**, 145; 1921, *Ann. Mag. n. H.* (9), **VII**, 165. Genotype: *arcuata* Stein.

1921. *Antipodomyia* Mall., *Ann. Mag. n. H.* (9), **VII**, 429. Genotype: *bancrofti* Mall. n. syn.

Head with large eyes, holoptic in male, with the inclinate setae not or hardly ascending beyond middle, dichoptic in female; parafacialia and jowls more or less narrow, the former bare; arista bare (pollinose) or short-pubescent. *Thorax* with 2 *prst dc* and without or with an indistinct *pra*; prosternum, propleural depression and pteropleura bare. *Abdomen* subcircular to subovate, without any very strong setae, hypopygium more or less small, ventrobasal scale with a marginal fringe of stiff black setulae. *Wings* unspotted, veins quite bare except for costa, which is haired even on underside, *sc* slightly sinuous between point farthest from costa and forward bend, which is conspicuous, *m* as a rule markedly upcurved at apex. Lower calyptra of *Phaonia* type. Halteres pale. *Legs:* Anterior tibiae in Oriental species without submedian setae except for the *p* seta(e) of the mid tibia; mid femur without an *a* pre-apical; hind tibia without *pd* setae and a distinct *ad* pre-apical.

Distribution.—World-wide.

Biology.—Adults on dung, sometimes entering houses (in which a European species sometimes hibernates in large numbers). Eggs deposited singly in cow-dung, provided with flanges (Thomson, 1947, *Proc. R. ent. Soc.* (A), **XXII**, 98). The larva (Figs. 10*k*, 11*s*) hatches as a second instar (at least in *distincta*) and feeds on other dung-inhabiting larvae, pupating in the soil in a cocoon glued together with mucus (at least in *versicolor*, Munro, 1925, *S. Afr. J. nat. Hist.*, **V**, 60).

Concerning *Antipodomyia* see *G. subtilis*, p. 624.

Key to the Species of Gymnodia

1 (2) 2–2·8 mm. 3 *post dc. prsc* level or almost level with the last *dc*. Mid tibia with only 1 *p* seta. Rows of *prst acr* less widely separated from each other than from *dc*. Vibrissa at mouth-margin. Dorsum of thorax almost wholly dusted fuscous-brown; in female more brown-grey with a narrow, inconspicuous more grey-dusted sutural and prescutellar band and apical part of scutellum. *subtilis* (Stein), p. 624

2 (1) 4 *post dc.* *prsc* behind level of last *dc.*

3 (10) Mid tibia with only 1 *p* seta. Rows of the *prst acr* less widely separated from each other than from the *dc.*

4 (9) 3·2–4·4 mm. Dark pattern of abdomen longitudinal on each side of the pale dusted median vitta, either forming an elongate vitta or coalescing with the posterior spot to form an *L*-shaped, trapezoidal or triangular spot.

5 (8) Third abdominal segment with a pair of large triangular spots (Fig. 151*a*) or, if the pattern is reduced, the (posterior) spot of each side closer to median line than to lateral margin (Fig. 151*b*). ♂: Pale dust of dorsal surface brown or brownish-grey, sutural band vestigial, broadly interrupted at middle and reduced to a narrow extension of the pale colouration of the notopleura laterally, prescutellar band more or less narrow, dorsal surface of scutellum wholly dark.

6 (7) Vibrissa distinctly above mouth-margin. Hind tibia with one *av* seta situated slightly beyond middle. ♂: Upper part of parafacialia glossy black; ground-colour of anterior three abdominal segments translucent pale testaceous, pale dusted median vitta linear. . .. . *ascendens* (Stein), p. 626

7 (6) Vibrissa at mouth-margin. Hind tibia with a small *av* seta at three-fifths and another at four-fifths of length. ♂: Parafacialia wholly dusted silver-white; ground-colour of abdomen wholly dark, pale dusted median vitta on second and third segments broad, at least as broad as the dark spots of the third.. .. .. *interposita* sp. n., p. 628

8 (5) Third abdominal segment with the paired posterior spot situated near hind angle, square or roundish (Fig. 152); spots of second segment often fused so as to form a paired symmetrically *L*-shaped pattern; fourth segment with narrow paramedian vittae on basal part. Vibrissa at mouth-margin.. . *distincta* (Stein), p. 630

9 (4) 4·6–6 mm. Intermediate abdominal segments (Figs. 154, 156) with

short roundish paramedian spots, which are usually fused into a transverse-elliptical or bean-shaped median spot but never on the third segment fused with the posterior spots, the latter strongly transverse. . *tonitrui* (Wied.), p. 631

10 (3) Mid tibia with 2 *p* setae. Outer rows of *acr* hairs more widely separated from each other than from the *dc*.

11 (12) Mouth-margin slightly produced between vibrissal angles (Fig. 153), the latter also somewhat prominent, vibrissa at mouth-margin (separated from it by less than width of palpus); occipital dilation separated from vibrissal angle and facial ridge, the space between them with some very short setulae. Eyes practically bare. *m* conspicuously upcurved. *parascendens* Hennig, p. 633

12 (11) Mouth-margin and vibrissal angles not produced (Fig. 155), vibrissa above mouth-margin, in male by almost width of third antennal segment; occipital dilation broadly reaching vibrissal angle and facial ridge, anterior part with numerous rather long strong erect setulae. Eyes densely long-haired, in female rather densely short-haired. *m* very slightly upcurved *lasiopa* sp. n., p. 636

288. **Gymnodia subtilis** (Stein).

1909. *Limnophora subtilis* Stein, *Tijdschr. Ent.*, **LII**, 244, 249; 1915, *Suppl. ent.*, **IV**, 38. Types: Batavia and Tankoeban Prahoe. Mus. Amsterdam.

1928. *Antipodomyia bancrofti* Mall.? of Mall., *Ent. Mitt.*, **XVII**, 297.

Fuscous-black with moderately dense whitish-grey and dark brown dust, mesonotum dark with pale grey-dusted notopleura, the pale dust in male narrowly extending for some distance along suture, in female forming a complete band along anterior side of suture, the declivity in front of scutellum in female grey-dusted, in male with or without some more greyish dust; first abdominal segment wholly dark, second and third with a narrow pale dusted median vitta, which may be vestigial on second; on third segment the median vitta broadened behind and often connected near

median line with the antero-lateral pale dusted triangles, which are rather large on both segments; fourth segment with a rather broad dark median vitta, which extends from base sometimes almost to apex where a pair of spots may be present and fused with it, this vitta sometimes indistinctly divided by a linear median vitta of paler brown dust. *Head* rather densely dusted pale grey with fuscous occiput and black interfrontalia; eyes practically bare, in male closely contiguous, interfrontalia obsolete except for a small triangle behind lunula, parafrontalia perfectly linear with the anterior third slightly broadened and carrying 3–4 small decussate setae, ocellars small, verticals very small and fine but distinguishable from occipital row; frons of female in front of anterior ocellus more than a quarter (0·26–0·28) head-width, very slightly dilated to vertex, more dilated with distinctly concave sides to lunula, where it is about two-fifths (0·37–0·41) head-width, frontal triangle hardly exceeding posterior third, dusted brownish-grey, interfrontalia evenly narrowed in anterior half, 3–4 times as wide at middle as a parafrontale, the latter with 3(–5) inclinate and 1(–2) reclinate setae, ocellars and verticals moderately strong; parafacialia obsolete in lateral view, jowls $\frac{1}{2}$–$\frac{2}{3}$ width of third antennal segment, the latter falling short of mouth-margin by less than its own width. *Thorax* with the *prst acr* in two rows, a pair anterior to level of second *dc* twice as strong, at most a few setulae between this and suture, *post acr* in specimens from Burma and India in about four rows, in a Sumatra specimen in two, *prsc* more or less exactly at level of last *post dc*, moderately strong, as are the 2 *ia*; lower *stpl* rather close to posterior one, somewhat stronger than anterior *stpl*. *Abdomen* subcircular-subcordate, very narrowly truncate at apex, hypopygium small and not protruding, fourth ventrite broadly emarginate; second and third segments with lateral marginals and discals, fourth with a marginal and discal row, which are weaker in female. *Wings* subhyaline, in male with a very slight brownish tinge; r_1 slightly exceeding level of *r-m*, which lies at almost three-fifths to two-thirds of discal cell; r_{4+5} evenly somewhat curved backward, *m* rather strongly upcurved to apex and very slightly sinuous. Calyptrae in male fuscous-brown, in female pale brownish-grey, border and fringe concolorous. *Legs:* Mid femur with 2 *p* pre-apicals and, in basal fourth, 2 moderately strong erect *pv* setae; hind femur with a rather strong *pv* seta near basal quarter or fifth and with 2–3 *av* near apex, hind tibia with a small *ad* and 1–2 *av* setae.

Length.—2·0–3·1 mm., of wings 2·3–3·4 mm.

Distribution.—CEYLON. S. INDIA (Tinnevelly Distr.). BURMA (Insein). JAVA. SUMATRA.

One of the doubtful females of *bancrofti* Mall. was presented by Dr. E. Jacobson to the B.M. and proves to be *subtilis* Stein. In spite of what Malloch says (1928, p. 297) both the Sumatran form and the type series have on the ventrobasal scale the fan of setulae which is typical of *Gymnodia*, and I doubt whether *bancrofti* is more than a subspecies of *subtilis*. The only character which I can find for separating the two forms is the forward position of the *prsc* in *bancrofti*, where they are separated from the level of the last *dc* by about one-third the distance between the latter and the scutellar suture. As expected (*B.M. Ruwenzori Exp.*, p. 473) the Ethiopian form identified as *subtilis* is a distinct species. The number of *stpl*, however, is 1+2 as in the present species, the setae in the only available specimen appearing like 1+1, as the posterior two happen to overlie each other.

289. **Gymnodia ascendens** (Stein).

(Fig. 151)

1915. *Limnophora ascendens* Stein, *Suppl. ent.*, **IV**, 32; 1918, *Ann. Mus. nat. Hungar.*, **XVI**, 155; Karl, 1935, *Arb. morph. taxon. Ent.*, **II**, 42. Types: Chip-Chip; Kanshirei; Kankau; Yentempo; Koshun. Deutsch. Ent. Inst. and Mus. Budapest.

1928. *Gymnodia ascendens* (Stein), Mall., *Ent. Mitt.*, **XVII**, 296; Hennig, *Beitr. Ent.*, **II**, 73.

Fuscous-black with rather dense pale grey dust and an extended dark pattern, in male ground-colour of anterior three abdominal segments pale testaceous but only visible on antero-lateral triangles of intermediate segments and ventral surface; mesonotum with only posterior part of shoulders, notopleurae (with an extension along lateral part of suture) and declivity in front of suture pale dusted, the dark areas in female only dusted greyish-brown and suffused, and the grey dust usually tending to divide up the dark areas (by reaching median line and sending a rather broad median vitta towards neck, and by the pale dusted prescutellar area being prolonged forward on each side of median line), scutellum in male wholly dark, in female usually with grey-dusted apical part; first abdominal segment wholly dark with only a pale linear hind margin, second and third (Fig. 151) with a pair of large fuscous-black spots, which leave pale dusted only a linear median vitta on second and a somewhat wider one (especially in female) on third segment, in addition to the pale dusted

antero-lateral triangles, fourth segment with narrow dark paramedian vittae. *Head* moderately densely dusted pale grey, occiput largely fuscous, upper part of parafacialia in male glossy black; eyes practically bare, in male closely contiguous in front of ocelli, interfrontalia obsolete except for the rather broadly triangular anterior third, parafrontalia perfectly linear in posterior three-fifths, moderately widened in

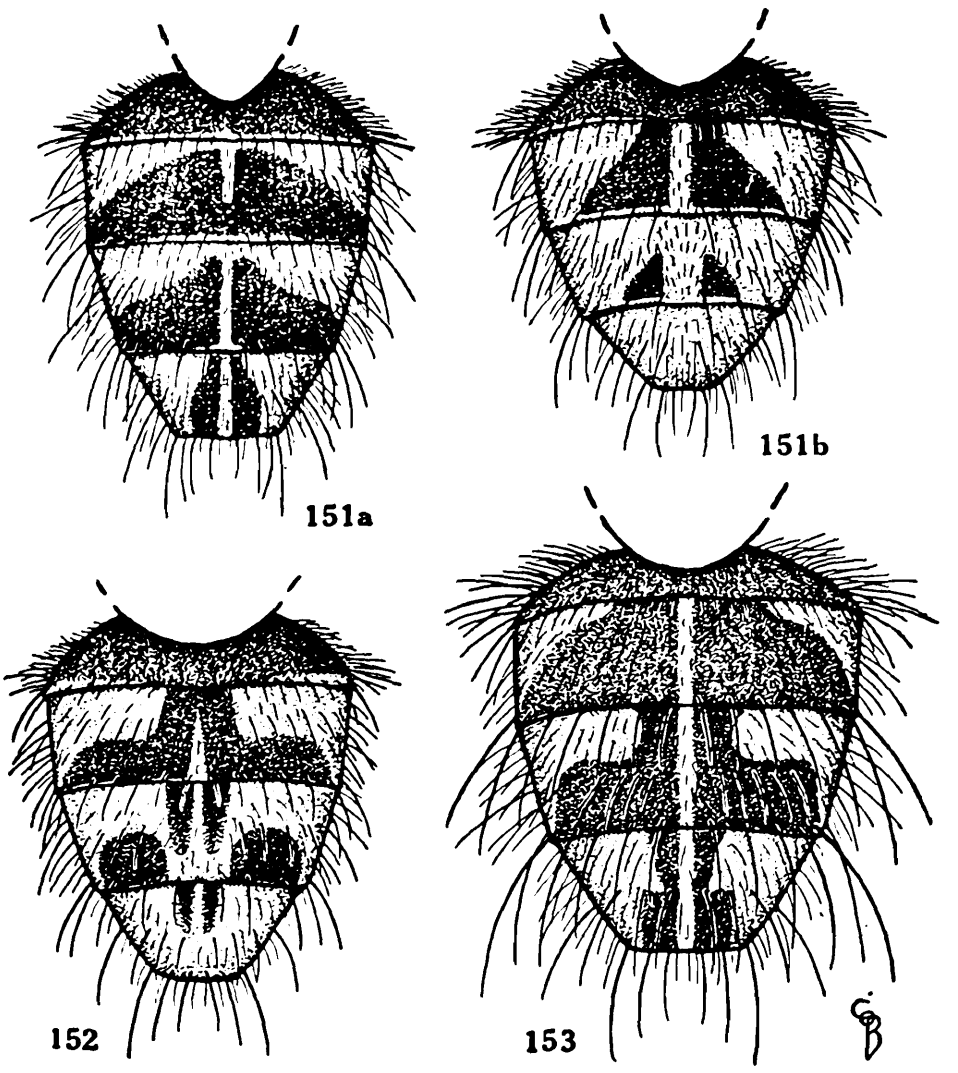


FIG. 151. *Gymnodia ascendens* (Stein), abdomen of male with (*a*) normal and (*b*) reduced pattern.

FIG. 152. *Gymnodia distincta* (Stein), abdomen of male.

FIG. 153. *Gymnodia parascendens* Hennig, abdomen of male.

front where 6–9 inclinate setae are present, ocellars small, verticals very small and fine though distinctly longer than occipital setulae; frons of female at vertex three-tenths (0·29–0·32) head-width, slightly dilated with somewhat concave sides to lunula where it is 0·36–0·37 times head-width, frontal triangle moderately densely pale dusted with concave sides, not much exceeding basal third of frons, interfrontalia

fuscous-black with thin whitish dust, rather conspicuously narrowed behind, evenly and slightly narrowed forward, five times as wide at middle as a parafrontale, the latter with 4–7 inclinate setae on anterior two-thirds and a moderately strong reclinate at level of anterior ocellus, ocellars and verticals moderately strong; parafacialia obsolete in lateral view or almost so, jowls hardly as wide as third antennal segment, vibrissal angles not produced, some distance above mouth-margin; third antennal segment falling short of mouth-margin by more than its own width, arista pollinose. *Thorax* with 2 rows of *prst acr*, which are less widely separated from each other than from *dc*, *prsc* moderately strong, anterior *ia* variable, lower *stpl* represented by 2–3 strong setulose hairs close to posterior *stpl*. *Abdomen* subcordate-short-ovate with truncate (♂) or pointed (♀) apex, hypopygium not protruding in dorsal, and hardly in lateral, view; hairs of male long and erect laterally, second segment with some quite conspicuous lateral marginals, second and third with small lateral discals, third and fourth with a row of rather strong—but those of fourth not very strong in female—marginals, which are somewhat weaker near middle, fourth in addition with a discal row. *Wings* greyish subhyaline with a slight brownish tinge and brown to pale testaceous veins; r_1 markedly exceeding or (some females) at least reaching *r-m*, which lies at two-thirds or three-fifths of discal cell, r_{4+5} evenly curved backward, *m* conspicuously upcurved and not or very slightly sinuous at apex. Lower calyptra opaque, in male pale grey with browned margin or wholly brown, in female dull yellowish-white, border and fringe concolorous. *Legs* without submedian setae on anterior tibia except for the *p* seta of the mid tibia; mid femur with 2 *pv* setae near base, 2 *p* pre-apicals and a *p* fringe of setulae, which are short in female but long and dense in male; hind femur with a small (in female very small) *v* seta at base and 1–2 *av* near apex, hind tibia with 1 *ad* and 1 *av* seta.

Length.—3·4–4·4 mm., of wings 3·4–4·2 mm.

Distribution.—CEYLON. INDIA (Bengal). N.E. BURMA. HONG KONG. FORMOSA. SUMATRA.

290. **Gymnodia interposita** sp. n.

♂: Fuscous-black with brown and brownish-grey dust, posterior three abdominal segments moderately densely dusted whitish-grey; mesonotum with rather conspicuous brownish-grey dust on posterior part of humeral callosity, on notopleura, from where it continues narrowly for some distance

along the suture, on a rather narrow band in front of scutellum and along the postalar callosities, and on ventral apical part of scutellum; first abdominal segment wholly dark but for a linear hind margin, second with a pair of large oblong trapezoidal spots, which reach fore margin but are separated from hind margin by a pale dusted line, third with a pair of small roundish dark spots near hind margin. *Head* with parafacialia dusted silver-grey; eyes bare, closely contiguous at middle of frons, interfrontalia vestigial in front of ocellar tubercle, visible as a small almost equilateral triangle above lunula, parafrontalia perfectly linear except in anterior third where they are somewhat dilated, and where 3–4 inclinate setae are present, 1–2 weak inclinate setae continuing the row almost to middle; ocellars weak, verticals setulose, the inner ones, however, distinguishable; parafacialia and jowls as in *subtilis*, third antennal segment falling short of mouth-margin by its own width. *Thorax* with the *prst acr* scarce, arranged in two rows, which are less widely separated from each other than from the *dc*, *post acr* apparently not much more numerous, *prsc* distinct, a little behind level of last *dc*, both *ia* moderately strong; lower *stpl* replaced by two weak bristles, which are much weaker than even the anterior *stpl* and much more widely separated from it than from the posterior one. *Abdomen* short-ovate-subtriangular, almost heart-shaped, narrowly truncate at apex, hypopygium not protruding, fourth ventrite broadly truncate with narrow rather strongly produced lateral lobes; hairs rather long and half-erect, setae therefore not very conspicuous, the anterior three segments with distinct lateral marginals and discals, which on the third one form almost complete rows, fourth with a row of well-developed marginals and discals. *Wings* subhyaline with pale testaceous veins; r_1 slightly exceeding level of *r-m*, which lies at two-thirds of discal cell; r_{4+5} evenly and gently curved backward, *m* moderately upcurved and slightly sinuous at tip. Lower calyptra brownish-grey with brown border and fringe (except on anterior outer part). *Legs* without submedian setae on anterior tibiae, except for the *p* seta of the mid tibia; mid femur with three short *pv* setae on basal two-fifths, the distal two being somewhat spine-like, 2 *p* pre-apicals and a fringe of *p* setulae; hind femur and tibia as in *ascendens*, but tibia with 2 small *av* setae beyond the level of the *ad*.

Length.—3·5 mm., of wings 3·7 mm.

Distribution.—INDIA: Pusa, Bihar, Botanical Area, 20. XII.34 (*Rangi*), ♂ type (in B.M.).

Somewhat similar to the EUROPEAN *G. humilis* (Zett.), in which R_5 is hardly narrowed at apex, the abdomen more ovate, the abdominal spots less widely separated on median line, that of the third segment larger, and the fourth segment also spotted.

291. **Gymnodia distincta** (Stein).

(Fig. 152)

1909. *Limnophora distincta* Stein, *Tijdschr. Ent.*, **LII**, 251, ♂ ♀; 1915, *Suppl. ent.*, **IV**, 37, 38; Karl, 1935, *Arb. morph. taxon. Ent.*, **II**, 43. Types: Semarang. Mus. Amsterdam.

1947. *Gymnodia distincta* (Stein), Muirhead Thomson, *Proc. R. ent. Soc. Lond.*, (A), **XXII**, 98, Figs. 27–31 (biology, larva).

Fuscous-black, densely dusted whitish-grey with a brown-dusted pattern; *prst* dark spot of mesonotum separated from *post* band by a complete moderately broad pale dusted vitta along suture, *post* band moderately broad, separated from base of scutellum by a broad pale dusted area, apex of scutellum rather broadly and conspicuously pale dusted; abdomen of male largely translucent pale testaceous, first segment wholly or largely dark on dorsum with a faint pale dusted median vitta, second to fourth (Fig. 152) with a narrow paramedian dark vitta, which extends from base to almost hind margin or, on fourth segment, about middle, second segment on each side of hind margin with a large semicircular spot, which tends to fuse with the paramedian vitta, third with a smaller paired semicircular to square spot, fourth without or with a pair of small roundish brown-dusted spots at lateral part of apex. *Head* densely dusted whitish-grey with fuscous occiput; eyes practically bare, in male contiguous, upper half of interfrontalia obsolete except for a minute triangular part near anterior ocellus, lower half forming a small triangle above lunula, parafrontalia linear and bare in upper half, lower half moderately dilated with 4–6 rather short inclinate setae, ocellars moderately strong, verticals very small but rather distinct, as the postocular setulae are even smaller; frons of female at vertex three-tenths (0·28–0·32) head-width, moderately dilated with slightly convex sides to lunula, where it is two-fifths (0·40–0·41) head-width, frontal triangle densely dusted whitish-grey, well defined, hardly exceeding posterior third of frons, interfrontalia fuscous-black with thin whitish-brown dust, almost parallel-sided, less than thrice as wide at middle as a parafrontale, the latter with 5 subequal inclinate setae on anterior three-fifths and one reclinate seta

not much behind them, ocellars moderately strong, verticals short but distinct; parafacialia obsolete below middle (in lateral view), jowls ½–⅔ width of third antennal segment. The latter falling short of mouth-margin by about half (♀) or fully (♂) its own width; arista bare (finely pollinose). *Thorax* with 2–4 pairs of small *prst acr*, the longitudinal rows less widely separated from each other than from *dc*, *post acr* smaller, arranged in about four longitudinal rows, *prsc* small but distinct, both *ia* moderately strong, anterior *stpl* weak, lower one hardly weaker than posterior and very close to it. *Abdomen* (Fig. 152) ovate, with pointed apex, anterior segments with lateral marginals, second with indistinct lateral discals, third with distinct lateral discals and a row of not very strong marginals, fourth with a row of discals and weak, in male moderately strong, marginals. *Wings* greyish subhyaline with pale testaceous veins; r_1 reaching level of *r-m*, which lies at almost two-thirds of discal cell, r_{4+5} very slightly and evenly curved backward, *m* conspicuously upcurved and somewhat sinuous at apex. Lower calyptra opaque brownish (♂) or greyish-white (♀) with more creamy or yellowish border and whitish fringe. *Legs* without submedian setae on anterior tibiae except for the *p* seta of the mid tibia, which lies well beyond middle; mid femur with 2 *p* pre-apicals and 2 small *pv* setae in basal third; hind femur with 2–3 *av* pre-apicals, hind tibia with an *ad* and an *av* seta.

Length.—3·0–3·7 mm., of wings 2·9–3·5 mm.

Distribution.—JAVA. FORMOSA. BURMA. ASSAM. NEPAL. INDIA (Bihar; Punjab). CEYLON.

292. **Gymnodia tonitrui** (Wiedemann).

1824. *Anthomyia tonitrui* Wied., *Anal. Ent.*, 52; 1830, *Aussereur. zweifl. Ins.*, **II**, 429. Type: India Or. Mus. Copenhagen.

1849. !var.: *Anthomyia canache* Walk., *List. Dipt.*, **IV**, 953. Type: Egypt. B.M.

1856. !*Anthomyia aliena* Walk., *Dipt. Saund.*, 363. Type: East Indies. B.M.

1868. *Anthomyia lobalis* Thoms., *Eugenies Resa, Dipt.*, 551; Stein, 1910, *Wien. ent. Ztg.*, **XXIX**, 66. Type: China. Mus. Stockholm.

1903. *Limnophora tonitrui* (Wied.), Stein, *Mitt. zool. Mus. Berlin.*, **II**, 105; 1906, *Berl. ent. Zschr.*, **XLI**, 65; 1913, *Ann. Mus. nat. Hungar.*, **XI**, 520; 1915, *Suppl. ent.*, **IV**, 36; Brunetti, 1907, *Rec. Ind. Mus.*, **I**, 381, Pl. XV, figs. 1, 2; Bezzi, 1908, *Bull. Soc. ent. ital.*, **XXXIX**, 112.

1903. *Limnophora variegata* Stein, *Mitt. zool. Mus. Berlin*, **II**, 104; 1915, *Suppl. ent.*, **IV**, 36.

1921. *Eulimnophora tonitrui* (Wied.), Mall., *Ann. Mag. n. H.* (9), **VII**, 165.

1951. *Gymnodia tonitrui* (Wied.), Emd., *B.M. Ruwenzori Exp., 1934-35*, II, 470, 474.
1951. *Gymnodia tonitrui canache* (Walk.), Emd., *B.M. Ruwenzori Exp., 1934-35*, II, 474.

Fuscous-black, densely dusted chalky white with a thinly brown-dusted black pattern consisting of a pair of large round *prst* spots, which extend from neck to *ph* and first *dc* or slightly beyond, and which are almost or quite fused anteriorly on median line, and a *post* band, which occupies about half the distance from suture to base of scutellum, almost or quite reaching base of third *post dc*, and which in var. *canache* is more or less broadly interrupted to the outer side of the *dc*; basal half or a little more of scutellum occupied by a similar band; abdomen pale testaceous, as a rule somewhat darkened apically, first segment wholly pale or lateral part browned or bordered by a narrow fuscous band, second and third (and often fourth) segments with a transverse bilobed median spot at base, second and third with a narrow (♂) or moderately broad (♀) fuscous hind margin, which extends from lateral part of ventral surface towards dorsal median line, leaving about the median quarter or fifth pale, fourth segment with a pair of roundish brown-dusted spots near hind margin; palpi often somewhat dull orange (especially in female), tibiae somewhat brownish translucent or ferrugineous. *Head* evenly and densely dusted white with fuscous occiput; eyes virtually bare, in male contiguous, parafrontalia linear, somewhat broadened in anterior two-fifths, where 4–5 small inclinate setae are present, 2 small reclinate setae at level of anterior ocellus, the anterior one the smaller, ocellars rather small, verticals very fine, hardly differentiated, frons of female at vertex almost one-third (0·30–0·33) head-width, rather strongly dilated with straight sides to lunula where it is almost two-fifths (0·35–0·39) head-width, ocellar triangle only reaching posterior third, densely dusted white, interfrontalia black, strongly and evenly narrowed in anterior three-fifths, slightly narrowed behind, less than thrice as wide at middle as a parafrontale, the latter with 4–7 moderately strong inclinate setae on anterior three-fifths, ocellars and verticals moderately strong; parafacialia about one-third as wide, jowls as wide to half as wide again, as third antennal segment, the latter falling short of mouth-margin by fully its own width or more; arista bare (pollinose). *Thorax* with 2 rather irregular longitudinal rows of *prst acr*, which are markedly (♂) or slightly (♀) less widely separated from *dc* than from each other, *prsc* moderately strong, well behind level of last *dc*, anterior *ia* rather weak; lower *stpl* weak, rather close to

posterior one. *Abdomen* subcordate-short-ovate with rounded truncate apex, hypopygium not visible in dorsal aspect, hardly protruding, fourth ventrite flat with broadly emarginate apex, hair rather erect and long laterally in male, second and third segments with lateral marginals, fourth with a row of moderately strong (♂) or weak (♀) marginals and an incomplete discal row. *Wings* subhyaline with brown and pale testaceous veins; r_1 hardly exceeding level of *r-m*, which lies at two-thirds to three-fifths of discal cell, r_{4+5} evenly somewhat curved backward, *m* conspicuously upcurved and somewhat sinuous at apex. Calyptrae greyish-white with concolorous border and fringe, lower one subopaque. *Legs* without submedian setae on anterior tibiae except for the *p* seta of mid tibia; mid femur with 2 *p* pre-apicals, which form the end of a row of longer *p* setulae, entirely bare between this row and a *pv* row of setulae, which contains 4–6 short setae near base, the setulae of these rows longer and denser in male; hind femur with 4–5 rather unequal (♂) or 1–2 (♀) *av* setae near apex and in male 4–6 rather fine and moderately long *pv* setae on basal half, hind tibia with 1 *ad* and 1–2 *av* setae.

Length.—4·6–5·9 mm., of wings 3·8–5·6 mm.

Distribution.—CEYLON. N. and C. INDIA (Karachi to Assam). SINGAPORE. FORMOSA. The type form and var. *canache* occur together, and transitional specimens are not rare. In PALESTINE, ADEN and EGYPT, however, only *canache* appears to be represented, whilst the ETHIOPIAN REGION (Sierra Leone to Eritrea to Zululand; Réunion) is inhabited only by the type form. *canache*, therefore, seems to have the characteristics of a subspecies in the Middle East but only of a variation in the ORIENTAL REGION. The species is not so far known from S. India, Burma and the Malay States (apart from Singapore, from where I have seen several specimens of both forms).

293. **Gymnodia parascendens** Hennig.

(Figs. 153, 154)

1952. *Limnophora* (*Gymnodia*) *parascendens* Hennig, *Beitr. Ent.*, II, 73. Type: Lombok. Deutsch. Ent. Inst.

Fuscous-black, with brown and pale grey dust, head of male dusted dark brown with lower part of occiput dusted whitish-grey, of female dusted brown, more greyish along

lower part of eyes, on jowls and most of occiput, mesonotum of male black with thin dark brown dust, which is denser at shoulders and sides, scutellum usually with some grey dust at tip, mesonotum of female brown-dusted, more greyish at shoulders and sides, sometimes with the beginning of brownish-grey paramedian vittae, apex and lateral surface of scutellum dusted grey; abdomen (Fig. 153) with dorsal surface of first segment almost wholly dark except for a faint pale dusted median vitta, intermediate segments with a well-defined pale dusted median line and an antero-lateral pale dusted trapezoidal to rectangular area, which in male is

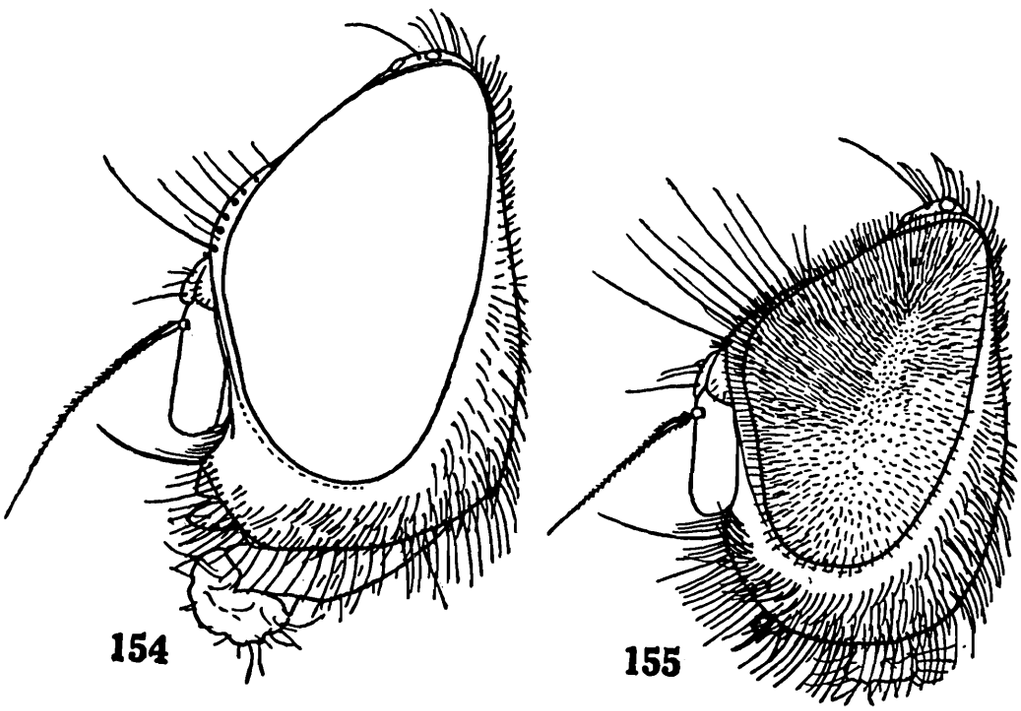


FIG. 154. *Gymnodia parascendens* Hennig, head of male.
FIG. 155. *Gymnodia lasiopa* sp. n., head of male type.

more or less translucent testaceous, the dark colouration thus forming a pair of very broadly *L*-shaped spots, fourth segment on each side of the pale dusted complete median line with a dark vitta, which is more or less dilated outwardly in posterior half or more, fore margin of posterior segments also often browned laterally. *Head* (Fig. 154) without any silver-white dust; eyes almost bare, in male closely contiguous, interfrontalia forming a narrow *V*-shaped line in front of anterior ocellus, middle third obsolete, anterior third visible as a moderately broad brownish-black triangle, parafrontalia obsolete in more than posterior half, moderately broad

towards lunula, where 7–10 very unequal inclinate setae are present, ocellars rather weak, verticals very fine but markedly longer than setulae of occipital row; frons of female at vertex three-tenths (0·30–0·32) head-width, moderately dilated with almost straight sides to lunula, where it is almost two-fifths (0·37–0·38) head-width, frontal triangle dusted brown, drawn out to beyond middle of frons, interfrontalia slightly narrowed behind, rather strongly in anterior third, about four times as wide at middle as a parafrontale, the latter on anterior three-fifths with 4–6 rather strong inclinate and above with 2 reclinate setae, ocellars rather strong, verticals not very long but quite strong; parafacialia in lateral view hardly a quarter, jowls equal to (♂) or one-and-a-half times (♀), width of third antennal segment, the latter falling short of mouth-margin by its own width; arista short-pubescent, longest hairs about as long as its basal diameter. *Thorax* with the *acr* hairs very fine, *prst acr* in 4 longitudinal rows, *prsc* conspicuous, moderately strong like both *ia*, first, third and fourth *dc* not much stronger; lower *stpl* weaker than anterior one and more than twice as far from it as from posterior one. *Abdomen* (**Fig. 153**) short-ovate to subcordate with more (♂) or less (♀) truncate apex, hypopygium not protruding, fourth ventrite truncate or very shallowly emarginate, hair of male very long and conspicuous on lateral and posterior parts, second and third segments with a conspicuous marginal row laterally, which is completed medially by weaker setae or setulae, third in female also with weak lateral discals, fourth with a discal and a marginal row, the latter in female weak. *Wings* brownish subhyaline with dark brown and light brown veins, r_1 reaching level of *r-m*, which is strongly oblique and lies near two-thirds of discal cell, r_{4+5} very slightly and evenly curved backward, *m* rather strongly upcurved and very slightly sinuous at apex, *m-m* somewhat oblique in male. Calyptrae brown in male, pale brownish-grey in female, border and fringe concolorous (but paler laterally at base). *Legs* without submedian setae on anterior tibiae, except for the 2 *p* setae of the mid tibia; mid femur with 2 *p* pre-apicals, 2–4 short but rather strong *pv* setae in basal third and an *av* and *p* fringe of longer (more so in male) setulae, the *pv* fringe more conspicuous, especially towards apex; hind femur with 3–6 (♂) or 2–3 (♀) *av* setae in apical half or less, hind tibia with an *ad* and an *av* seta.

Length.—4·5–5·9 mm., of wings 4·8–5·9 mm.

Distribution.—Lombok. N.E. Burma.

294. **Gymnodia lasiopa** sp. n.

(Figs. 155, 156)

♂ ♀ : Fuscous-black with brown dust, which is very inconspicuous on mesonotum in male, except in an anterior view and laterally, but which forms three inconspicuous suffused broad vittae on a more greyish-brown dusted ground in female, abdomen (Fig. 156) dusted brownish-grey with brown-dusted spots; which are much more conspicuous and fuscous-brown in male, first segment wholly dark on dorsum except for a rather narrow median vitta and a linear hind margin, second to fourth on each side of a moderately narrow pale dusted median vitta with a gradually smaller spot, that on fourth segment being small and roundish, that on third *L*-shaped, the longitudinal arm being rather narrow and reaching base and almost hind margin, the transverse arm very broad and extending in male only half-way, in female almost to lateral margin of segment, that on second segment large, leaving a linear hind margin, an antero-lateral triangle and in male a broad, in female a narrow, lateral margin dusted greyish, antero-lateral margin of the dark spot somewhat concave. *Head* (Fig. 155) with pale brown-dusted face, parafacialia in male with somewhat golden reflections, lower part of occiput with thin greyish dust; eyes densely long-haired in male, the hair shorter in female; eyes of male closely contiguous, interfrontalia visible on less than anterior half, where they form a small, almost equilateral triangle, parafacialia almost obsolete in upper half, moderately broadened to lunula with about 9–12 setae and long setulose hairs in a dense mixed row on anterior half, ocellars fine and verticals very fine, all not very distinct; frons of female at vertex fully one-third (0·33–0·35) head-width, rather strongly dilated with as a rule slightly concave sides to lunula, where it is well over two-fifths (0·44–0·45) head-width, frontal triangle somewhat dusted greyish-brown, apex drawn out and fading out towards lunula, interfrontalia fuscous-black with thin brown dust, conspicuously narrowed to both ends but more suddenly so anteriorly, about four times as wide at middle as a parafrontale, the latter on anterior three-fifths with 4 strong inclinate setae, towards level of anterior ocellus with 2 reclinate setae and on outer part with an irregular row of proclinate black setulae, ocellars and verticals strong but not very long; parafacialia in lateral view a third or quarter, jowls almost, as wide as third antennal segment, occipital dilation almost entirely occupying jowls, with numerous erect, rather long, somewhat upcurved hairs. Third antennal segment falling short of mouth-

margin by almost its own width; arista short-pubescent, longest hairs about as long as its basal diameter. *Thorax* with 4 (in type 4–6) longitudinal rows of fine, in male long and erect, *prst acr*, *prsc* indistinct or small, 2+4 strong *dc*, both *ia* moderately strong, anterior and lower *stpl* subequal, in male rather fine and not very conspicuous among the rather numerous and long setulose hairs, lower *stpl* closer to posterior than to anterior one. *Abdomen* (Fig. 156) short-ovate with

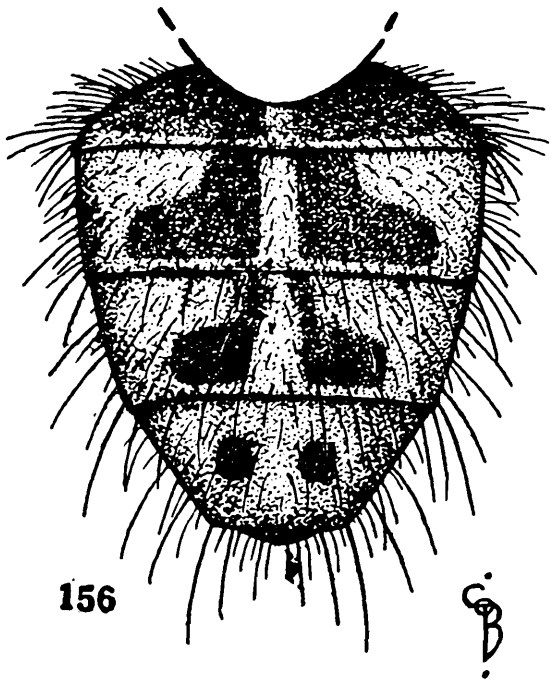


FIG. 156. *Gymnodia lasiopa* sp. n., abdomen of male.

rounded-truncate (♂) or subacuminate (♀) apex, hypopygium narrowly visible in dorsal aspect, fourth ventrite with a broad and rather deep trapezoidal excision and broad rounded lobes; hair in male rather long and erect, especially laterally, first segment with fine or indistinct lateral marginals, second with a row of fine marginals, which become hair-like near middle, third with a distinct row of fine marginals and in male fine erect discals, in female with only lateral discals, fourth with a row of discals and marginals, the latter rather weak in female. *Wings* subhyaline with a slight brownish tinge and brown and light brown veins, r_1 slightly exceeding or reaching *r-m*, which is somewhat oblique and lies between two-thirds and three-fifths of discal cell, r_{4+5} evenly very gently curved backward, *m* distinctly but slightly upcurved and very slightly sinuous towards apex. Calyptrae in male brownish-white, in female pale yellowish-grey with concolorous border and pale golden fringe. *Legs* without submedian setae on anterior tibiae except for the 2 *p* setae of the

mid tibia; fore femur of male with dense erect fine hairs; mid femur in male somewhat long-haired, with a *p* fringe of dense long setulose hairs, and in basal half with 5–6 *pv* setae, in female with 3–4 small *pv* setae on basal third, and, in both sexes, with 2 *p* pre-apicals and an *a* row of erect setulose hairs on basal half; hind femur towards apex with 2–1 small and 2–3 strong *av* setae and in male on basal half a dense row of erect *p* hairs, hind tibia with an *ad* and *av* seta.

Length.—4·0–5·0 mm., of wings 3·8–4·8 mm.

Distribution.—N. INDIA: Simla, 7,000 ft., 24.IV.07 (*N Annandale*), ♂ type (Ind. Mus., Calcutta), 12–13.V.13, 1 ♂ paratype (in B.M.). N.E. BURMA: Kambaiti, 2,000 m., 8.IV–18.V.34 (*R. Malaise*), 4 ♀ paratypes.

The males and females here described are certainly extremely closely related and almost certainly conspecific. However, an element of doubt remains, as they have been found at so widely separated localities, and as there are quite a number of differences, which, however, may be only secondary sexual characters.

ALPHABETICAL INDEX

N.B.—Numbers in italics indicate pages containing detailed description.

abnormis (*Limnophora*), 616
abnormis (Spilogona), 616
acerba (Phaonia), 271
acrostichalis (Dichaetomyia), 371
acrostichalis (Phaonia), 240
addida (*Dichaetomyia*), 354
adumbrata (Graphomyia), *546*, 552
adumbrata (*Musca*), 546
affinis (Hydrotaea), 315
affixa (Morellia), 113
albina (Musca), 40, *56*
albisquama (Morellia), 101
albitarsis (Limnophora), 570
albolineata (*Musca*), 148
albolineatus fuscisquamosus (Polietes), 149
albolineatus (Pseudomorellia), 149
albonigra (Limnophora), 562
aliena (*Anthomyia*), 631
alpicola (Pogonomyia), 286
alterna (Dichaetomyia), 356
alterna (Mydaea), 402
alutia (*Rheamyia*), 607
Anaclysta, 618
analis (*Cyrtoneura*), 192
Anatomy, 11
ancilla (Mydaea), 486
angustatifrons (Limnophora), 571
angustibucca (Limnophora), 576
angustifrons (*Haematobia*), 170
anthrax (*Anthomyia*), 305
Antipodomyia, 622
apicalis (Dichaetomyia), 407, *408*
apicalis (*Lophomala*), 408
apicalis (*Mydaea*), 407, 408
apicalis (*Spilogaster*), 408
apicefemoralis (Phaonia), 254
apiciseta (Limnophora), 598
appendiculata (Helina), 534
appendiculata (*Mydaea*), 534
appropinquans (Limnophora), 602
arctata (Helina), 531
argentata (*Aricia*), 468, 490
argentata (*Eumydaea*), 490
argentata (Limnophora), 583
argentata (Mydaea), 490
argentata (*Spilogaster*), 490
argentigena (Helina), 525
Aricia, 493
armata (*Dichaetomyia*), 334, 349, 351
arminervis (*Mydaea*), 448
armipes (Hydrotaea), 320
armipes (*Musca*), 320
ascendens (Gymnodia), 626
ascendens (*Limnophora*), 626
atkinsoni (Phaonia), 276
atratula (Dichaetomyia), 374
atrifacies (*Somomyia*), 124
atripes (Graphomyia), 548
atrisquama (Hydrotaea), 321
atrisquama (Morellia), 107
atronitens (Phaonia), 228
attenta (*Eumydaea*), 488
attenta (*Mydaea*), 488
aurantiaca (Dichaetomyia), 372
auricoxa (Phaonia), 270
aurocaudata (Mesembrina), 115
austeni (Haematostoma), 167
australis (*Haematobia*), 176
australis (Hydrotaea), 314
Australophyra, 299
autumnalis (Musca), 40, *78*
Awatia, 40
Azelia, 330

bakeri (*Musca*), 84, 86
bakeri illingworthi (Musca), 84
bancrofti (*Antipodomyia*), 624, 626
basichaeta (Phaonia), 247
Bdellolarynx, 168, *172*
benedicta (*Pyrellia*), 124
bengalensis (Limnophora), 542
bengalensis (*Lucilia*), 129
bengalensis (Stomoxys), 163
bezii (Musca), 41, 76, *83*, 89
bibax (*Anthomyia*), 365

bibax (Dichaetomyia), 365
bina (*Anthomyia*), 432
bina (*Anthomyia*, pars), 444
bina (Xenosia), 432
bina brunneifemorata (Xenosia), 433
Biology, 21
Biomyia, 40
biplaga (Dichaetomyia), 370
biseta (Morellia), 110
bivittata (*Musca*), 62
bovina (*Haphospatha*), 179
brasiliana (*Synthesiomyia*), 191, 192
breviceps (Limnophora), 582
breviplumosa (Helina), 539
breviplumosa (Phaonia), 262
breviventris (Limnophora), 596
Brontaea, 622
brunneigena (Helina), 523
brunneisquama (Morellia), 102
brunneitibia (Dichaetomyia), 406
brunneofemorata (Dichaetomyia), 373
brunnescens (Limnophora), 580
brunnettiana (Mydaea), 475
brunnipes (*Stomoxys*), 161
Bryantina, 543
Buccophaonia, 212
Byomyia, 40, *60*
Byomya, 40

cadaverina (*Musca*), 136
cadaverina (Pyrellia), 134, *136*
caerulea (*Ophyra*), 305
caesarion (*Musca*), 121
caesarion (Orthellia), 121
calcitrans (*Conops*), 156, 160
calcitrans (Stomoxys), 156, *160*
Calliophrys, 554
Calyptrata, 32 (*Key*)
calyptrata (Phaonidia), 204
canache (*Anthomyia*), 631, 633
canoapicata (Xenosina), 457
capensis (*Anthomyia*), 305
capensis (Ophyra), 305
cashmirensis (Helina), 520
cashmirensis (*Spilaria*), 520
ceylanica (Limnophora), 607
chalcogaster (*Anthomyia*), 301
chalcogaster (Ophyra), 301
chalybaea (*Neomyia*), 116
chalybaea (Orthellia), 132
chalybaea (*Stenomitra*), 117
chalybaea faceta (Orthellia), 131
chrysomyzina (Morellia), 98
cilifemorata (Hydrotaea), *317*, 319
cilitibia (Phaonia), 261
cinerea (Hydrotaea), 319
cinerella (Paragle), 542
cingalaisina (Musca), 70
claripennis (Orthellia), 130
Classification, 25
coerulea (*Musca*), 124
coerulea (Orthellia), 124
coeruleicolor (Phaonia), 277
coeruleifrons (*Lucilia*), 124, 127
coeruleifrons (Orthellia), 127
coeruleifrons (*Orthellia*, nec Macq.), 131, 133
cognata (Dichaetomyia), 397
compuncta (Spilogona), 611
conducens (Musca), 68
congressa (*Ophyra*), 301
conica (Limnophora), 602
contraria (*Mydaea*), 492
corbetti (*Phaonia*), 202
corbetti (Phaonina), 202
Cordyluridae, 32
cornicina (Orthellia), 116
cornicina (*Pseudopyrellia*), 117
coronata (Helina), 515
coronata (*Mydaea*), 515
corvina (*Musca*), 40
craggi (Musca), 77
crassirostris (Musca), 48, *71*
Cryptolucilia, 117
curvimedia (Dichaetomyia), *413*, 421
curviseta (Phaonia), 273
curvivena (Dichaetomyia), 362
cuthbertsoni (Musca), 53
cyanella (*Eudasyphora*), 139
cyanicolor (Dasyphora), 144
cyanicolor (*Morellia*), 138, 139
cyanicolor (*Pyrellia*), 139
cyanicolor kempi (Dasyphora), 144
cylindrica (*Limnophora*), 615
cyrtoneurina (*Aricia*), 326
cyrtoneurina (Hydrotaea), 326

dasyops (*Musca*), 58, 60
Dasyphora, *139*; 140 (*Key*)
Dasyphorina, 139
debilis (Phaonia), 279
decipiens (Dichaetomyia), 377
demandata (Chrysomyza), 100
Dendrophaonia, 283
dentipes (Hydrotaea), 323
dentipes (*Musca*), 323
determinata (*Musca*), 55

detrita (Mydaea), 485
dichaeta (Dichaetomyia), 361
Dichaetomyia, *333*; 335 (*Key*)
dichaetomyiina (Tamilomyia), 426
Dichaetomyiini, *332*; 333 (*Key*)
diffidens (*Musca*), 132
diffidens (Orthellia), 132
diffidens (*Orthellia*, nec Walk.), 124
diluta (Mydaea), 373
dimidiata (*Dichaetomyia*), 356, 398
dimorpha (Spilogona), 612
discimana (Mydaea), 485
dissimilis (Xenosina), 462
distincta (Gymnodia), 630
distincta (*Limnophora*), 630
divaricata (*Musca*), 55
domestica (Musca), 40, 46, *54*
domestica nebulo (Musca), 53, *55*
domestica vicina (Musca), 55
dorsalis (Helina), 493
dorsocentralis (Dichaetomyia), 364, 365
dubitalis (Stomoxys), 165
dubitalis (*Xenosina*), 448
duodecimpunctata (*Azelia*), 330
duplex (*Helina*), 534
duplex (*Mydaea*), 534
duplicata (*Helina*), 535

Eggs, *11*; 13, 151 (*Key*)
electa (*Orthellia*), 118
elongata (*Limnia*), 554
elongata (Xenosina), 450
Emusca, 40, 72
equina (*Haphospatha*), 179
eremophila (Anaclysta), 618
erratica (*Musca*), 217
Eudasyphora, 139
Eulimnophora, 622
Eumesembrina, 114
Eumusca, 40, *72*
Eumydaea, 468
Eumyiospila, 468, *488*
euphemioidea (*Helina*), 493
Euphoria, 117
eurymetopa (Helina), 522
Euspilaria, 493, *515*
euspilariodes (Mydaea), 475
eutaeniata (*Musca*), 62
exigua (*Haematobia*), 176
exigua (Lyperosia), 176
eximia (*Lucilia*), 128
Explanations, systematic part, 30
exsurda (*Aricia*), 554

faceta (*Neomyia*), 131
fallax (Limnophora), 573
fasciata (Musca), 67
femorata (Xenosina), 444
flavinota (Phaonia), 242
flavipalpis (Dichaetomyia), *367*, 368, 388
flavipalpis (*Lophomala*), 367
flavipalpis (*Mydaea*), 333, 367, 402
flavipennis (Dasyphora), 147
flavipennis (*Pahangia*), 433, 453
flavipennis (Xenosina), 453
flavipes (Dasyphora), 139, *146*
flavitarsata (Mydaea), 477
flavocaudata (Dichaetomyia), 398
flavohirta (*Lyperosia*), 176
flavomaculata (Phaonia), 253
fletcheri (Musca), 80
fletcheri (Orthellia), 122
flexa (Anaclysta), 619
flexa (*Anthomyia*), 619
florea (Azelia), 330
formosana (Musca), 88
formosana (*Musca*), 70
Fraseria, 199
freyana (Phaonia), 256
fulvitarsus (Dichaetomyia), 370
fulvoapicata (Dichaetomyia), 391
fulvomaculata (Fraseria), 199, *200*
fumaria (Dichaetomyia), 379
fumipennis (Pogonomyia), 287
fumosa (Helina), 511
fuscana (Limnophora), 599
fuscicoxa (Phaonia), 278
fuscisquama (Helina), 514
fuscisquama (*Mydaea*), 514
fuscitibia (Megophyra), 295
fusciventris (Dichaetomyia), 374
fuscocalyptrata (*Ophyra*), 304
fuscorufa (*Euspilaria*), 493

gavisa (*Neomyia*), 132, 166
geniculata (*Siphona*), 173
genimaculata (Limnophora), 564
gibsoni (Musca), 65, 83, *86*
glauca (Phaonia), 245
glaucescens (Limnophora), 594
glaucescens (Phaonia), 245

Glossinella, 173, *178*
gracilis (*Anthomyia*), 303
Graphomyia, *544*; 544 (*Key*)
greeni (*Musca*), 88, 89
grisea (*Hyadesimyia*), 192
gurnei (*Philaematomyia*), 89
gurneyi (*Philaematomyia*), 89
Gymnodia, *621*; 622 (*Key*)

Haematobia, *168*; 171 (*Key*)
Haemätobia, 174
Haematobina, 169
Haematostoma, 167
halterata (*Hebecnema*), 504
halterata (Helina), 504
handschini (Dichaetomyia), 403
Haphospatha, 173
Hardyia, 207
Hebecnema, 493, *501*
Helina, *493*, *520*; 494 (*Key*)
Helinella, 492, *511*
heliniformis (Spilogona), 615
Heliographa, 554, *604*
hervé-bazini (Dasyphora), 146
hervei (Musca), 75
heterochaeta (*Muscina*), 195
heterochaeta (Passeromyia), 194, *195*
heterocnemis (Dichaetomyia), *381*, 413
heteromma (Dichaetomyia), 385
heteromma (Phaonia), 238
hilariformis (*Spilogaster*), 283
himalayensis (Limnophora), 591
hirtifemorata (Helina), 532
hirtitibia (Megophyra), 296
hirudo (*Haphospatha*), 173
holoxantha (Dichaetomyia), *387*, 415
hortensia (Morellia), 108
hortensia (*Musca*), 108, 110
hortensia hortulana (Morellia), 110
hortorum (Morellia), 92, *105*
hortorum cashmirana (Morellia), 104
hortulana (*Musca*), 110
humilis (*Musca*), 61
Hydrotaea 299, *307*; 309 (*Key*)
Hypodermodes, 114

illingworthi (*Musca*), 84, 89
impuncta (*Aricia*), 493
impunctata (*Aricia*), 493
inaperta (*Aricia*), 360
inaperta (*Spilogaster*), 360
incerta (*Musca*), 64
indecora (Passeromyia), 194
indica (*Anthomyia*), 369
indica (Dichaetomyia), 369
indica (*Lucilia*), 126
indica (*Musca*), 40, 70
indica (Orthellia), 126
indica (*Spilogaster*), 369
indica (Stomoxys), 161
indicata (*Anthomyia*), 301
inferior (Musca), 89
inferior (*Philaematomyia*), 89
infranitens (Helina), 530
innocua (Limnophora), 602
insignis (*Heliographa*), 604
insignis (Limnophora), 604
insignis (*Philaematomyia*), 40, 71
insignis (*Spilogona*), 604
integra (*Aricia*), 490
interfrontalis (Phaonia), 275
interposita (Gymnodia), 628
interrupta pilifacies (Musca), *58*, 60
intona (*Heliographa*), 609
intraalaris (Megophyra), 294
intrahens (*Lucilia*), 124
irritans (*Conops*), 173
irritans (*Lyperosia*), 179
irritans (*Stomoxys*), 168, *173*

jacobsoni (Hydrotaea), 312
jacobsoni (*Parahydrotaea*), 307, 312
javana (*Hydrotaea*), 609

kambaitiana (Mydaea), 481
kambaitiana (Phaonia), 236
kasauliensis (*Musca*), 60
kashmirensis (Phaonia), 269
keiseri (Dichaetomyia), 354
kempi (*Limnophora*), 542

laeviventris (*Dichaetomyia*), 365
laeviventris (*Lophomala*), 365
laeviventris (*Mydaea*), 365
lardaria (*Musca*), 148
Larvae, *15*; 19, 152 (*Key*)
lasiopa (Gymnodia), 636
lasiopa (Hydrotaea), 328
Lasiopelta, 434
lasiophthalma (*Eudasyphora*), 139
lasiophthalma (Xenosina), 440
Lasiops, 191
latecostata (Phaonia), 241
latifrons (*Haematobina*), 169
latifrons (*Musca*), 61
latifrons (*Orthellia*), 126, 127

lati-parafrons (*Musca*), 68, 87
latipennis (*Stomoxys*), 161
latiseta (Limnophora), 568
latistriata (Dichaetomyia), 417
latitarsis (Dichaetomyia), 383
latitarsis (*Lophomala*), 383
latitarsis (*Mydaea*), 383
latreillei (*Eumesembrina*), 114
lauta (*Musca*), 128
lauta (*Mydaea*), 458, 511
lauta (Orthellia), 128, 129
lauta (*Scutellorthellia*), 117
lauta (Xenosina), 458
lenticeps (*Anthomyia*), 511
lenticeps (Helina), 511
lenticeps (*Mydaea*), 493
leucostoma (*Anthomyia*), 298, 302
leucostoma (Ophyra), 302
limbata (*Stomoxys*), 161
Limnella, 554
Limnia, 554
Limnophora, 554, *562*; 555 (*Key*)
Limnophorini, 541; 542 (*Key*)
lineata (*Pristirhynchomyia*), 40, 68
lineata (*Spilogaster*), 357
Lissosterna, 41, *56*
lobalis (*Anthomyia*), 631
longicornis (Muscina), 195
longicornis (Mydaea), 468, *478*
longicornis (Passeromyia), 194
longicornis (*Pendleburyia*), 468, 478
longipalpis (*Lyperosia*), 178
longipalpis (Phaonia), 264
longiplumosa (Phaonia), 258
longiscutellata (Mydaea), 486
Lophomala, 333
lucens (Musca), 63
lucens (*Pristirhynchomyia*), 63
lucorum (Helina), 477, *519*
lucorum (*Musca*), 519
lucorum (*Spilaria*), 519
lucorum (*Spilogaster*), 519
lusoria (Musca), 79
luteipes (Phaonia), 231
luzonensis (Helina), 596
Lyperosia, 173; 175 (*Key*)
Lyperosia, 153 (pars)
Lyperosiops, 168

macei (Limnophora), 542
macrophthalma (*Limnophora*), 589
macrostemma (Phaonia), 259
maculata (Graphomyia), 544, *552*
maculata (*Musca*), 544, 552
maculosa (*Limnophora*), 573
maculosa (Stygeromyia), 153, *154*
magnifica (Mesembrina), 115, 116
magnipalpis (Phaonia), 265
malaiseana (Mydaea), 485
malaiseana (Phaonia), 257
malaisei (Dasyphora), 145
malaisei (Hydrotaea), 319
malaisei (Limnophora), 593
malaisei (Musca), 91
malayana (Dichaetomyia), 349
malayana tamil (Dichaetomyia), 352
mallochi (Limnophora), 566
manca (Dichaetomyia), 379
mediana (*Musca*), 61
meditabunda (*Musca*), 468
meditabunda angustifrons (Mydaea), 472
megophthalma (Helina), 508
Megophyra, *289*; 291 (*Key*)
Melanochelia, 554
melanotela (Dichaetomyia), 415
mellina (Graphomyia), 548
meridiana (Mesembrina), 114, 115
meridiana (*Metamesembrina*), 114
meridiana (*Neomesembrina*), 114
Mesembrina, 114
metallica (*Anthomyia*), 301
Metamesembrina, 114
meteorica (*Hydrotaea*), 307
mindanaensis (*Helina*), 537
minuta (Lyperosia), 178
minuta (*Musca*), 67
mitis (*Pyrellia*), 135
modesta (*Musca*), 71
Morellia, *92*; 93 (*Key*)
morosa (*Mydaea*), 433, 456
morosa (Xenosina), 456
Morphology, 1
multispina (*Musca*), 55
Musca, 40, *53*, 55; 43 (*Key*)
Musca, 58
Muscidae, 6, 8, 10, 19, 21, *32*; 33 (*Key*)
Muscina, 215
Muscinae, *36*; 37, 39 (*Keys*)
Mydaea *468*, 475; 469 (*Key*)
Mydaeaini, *427*; 428 (*Key*)
Myiographa, 554

Myiospila, 468, *472*
mystacea (*Hypodermodes*), 114

nebulo (*Musca*), 55
nemorum (Helina), 517
nemorum (*Mydaea*), 517
Neomesembrina, 114
Neomyia, 116
nervosa (Helina), 537
nervosa (*Mydaea*), 537
nigerrima (*Pyrellia*), 109
nigra (*Anthomyia*), 303
nigra (Ophyra), *303*, 304
nigricauda (Dichaetomyia), 390
nigridorsata (Dichaetomyia), 412
nigriscota (*Aricia*), 490
nigrisquama (Morellia), 108
nigrithorax (*Hebecnema*), 507
nigrithorax (Helina), 507
nigrithorax (*Musca*), 60
nigrithorax (*Spilogaster*), 507
nitans (Helina), 503
nitida (*Anthomyia*), 298
nitidifacies (*Orthellia*), 132
nitidiventris (Dichaetomyia), *338*, 374
nitidiventris (*Mydaea*), 374
niveipalpis (*Dichaetomyia*), 334
niveipalpis (Spilogaster), 334
niveisquama (*Musca*), 62
nubiana (Dichaetomyia), 357
nubiana aureomarginata (Dichaetomyia), 358
nubianus (*Spilogaster*), 357
nudinervis (*Haematobia*), 172
nudiseta (*Cyrtoneura*), 192
nudiseta (Synthesiomyia), 191, *192*
nuditibia (Azelia), 331

oblongopunctata (*Stomoxys*), 163
obscurifrons (Ophyra), 307
obscuripennis (*Limnophora*), 566
obscuripes (*Cryptolucilia*), 126
obsignata (Limnophora), 593
obtrusa (*Pyrellia*), 124
occulta (*Anthomyia*), 325
occulta (Hydrotaea), 325
ochribasis (Limnophora), 607
Onchyomyia, 542
Ophyra, *298*; 299 (*Key*)
ophyroides (Morellia), 97
optata (*Musca*), 133
orientalis (*Lasiopelta*), 434, 464
orientalis (Xenosina), 464
Ornithomusca, 194
Orthellia, *116*; 118 (*Key*)
orthoneura (*Limnella*), 554
osiris (*Musca*), 57, 58
oxystoma (Phaonia), 233
oxystomodes (Phaonia), 237

pagana (Mydaea), 468
pahangensis (Dichaetomyia), 421
Pahangia, 433
pales (Steelea), 197
pallens (Dichaetomyia), 378
pallens (*Dichaetomyia*, nec Stein), 379
pallens (*Mydaea*), 378
pallens (*Panaga*), 379
pallitarsis (Dichaetomyia), 348
pallitarsis (*Lophomala*), 348
pallitarsis (*Mydaea*), 348
palustris (Limnophora), 554
Panaga, 379
Papuaia, 387, 388
paradoxa (Morellia), 110
Parahydrotaea, 307
parascendens (Gymnodia), 633
parascendens (*Limnophora*), 633
Passeromyia, 194
pattoni (Musca), 49, *64*
pattoni (*Musca*), 86, 88
Pattonia, 40
pectinifemorata (Helina), 528
pectinipes (Dichaetomyia), 410, 415, *419*
pectinipes (*Lophomala*), 419
pectinipes (Morellia), 112
pectinipes (*Mydaea*), 419
pellucida (*Eumyiospila*), 488
pellucida (Mydaea), 488
pellucida (*Spilogaster*), 488
pellucidiventris (*Helina*), 535
pendleburyi (Dichaetomyia), 423
pendleburyi (Limnophora), 578
Pendleburyia, 468
penicillata (Megophyra), 292
perakensis (Limnophora), 596
perfixa (*Musca*), 133
peroē (*Anthomyia*), 359
peroē (Dichaetomyia), 359
peroē (*Spilogaster*), 359
persimilis (Dichaetomyia), 393
pertusa (Helina), 493
phaeocnemia (Dichaetomyia), 355
Phaonia, *217*; 218 (*Key*)
Phaonidia, 203
Phaoniinae, *180*; 183 (*Key*)

Phaoniini, *185*; 186 (*Key*)
Phaonina, 201
Philaematomyia, 41, *71*
philippensis (*Lucilia*), 124
Phylogeny, 28
piceitarsis (Mydaea), 484
Pictia, 210
pilinervis (Dichaetomyia), 407, *410*
pilosa (*Musca*), 83
Placomyia, 41
planiceps (Musca), 49, *70*, 83
planiceps (*Musca*), 85, 89
platyptera (*Mydaea*), 284
platyptera (*Spilogaster*), 284
Plaxemia, 41, *57*
plumiseta (Limnophora), 589
Pogonomyia, 286
Polietes, 148
polita (Dichaetomyia), 333
polita (*Musca*), 129
pollinosa (*Musca*), 70
polystigma (Gymnodia), 621
porphyricola (*Pyrellia*), 124
posteroventralis (Helina), 527
potrix (*Glossinella*), 178
praecox (*Musca*), 68
prashadi (*Musca*), 78
pratensis (Gymnodia), 621
pratorum (Dasyphora), 139
pratti (*Stomoxys*), 161, 163
primitiva (*Musca*), 61
Pristirhynchomyia, 40
proerna (*Musca*), 129
proferens (Pyrellia), 138
prolixa (Dichaetomyia), 377
prolixa bioculata (Dichaetomyia), 375
prolixa pallidorsis (Dichaetomyia), 377
prominens (Limnophora), 574
promisca (*Musca*), 62
proocellata (Phaonia), 229
propinqua (*Helinella*), 512
propinqua (*Mydaea*), 493
propinqua (*Spilogaster*), 511
pruinosus (*Spilogaster*), 357
pseudofumosa (Helina), 510
Pseudolimnophora, 554
Pseudomorellia, 148
Pseudopyrellia, 117
Ptilolepis, 41, *89*
pubescens (*Anthomyia*), 298
pubescens (*Spilogaster*), 493
pubiseta (Limnophora), 587
pudica rufomarginata (Xenosina), 451
pulla (*Musca*), 77
pulla (Stomoxys), 166
Pupae, *21*
purpureonitens (Pyrellia), 137
pusilla (*Stomoxys*), 161
Pyrellia, *134*; 134 (*Key*)

quadrata (*Anthomyia*), 360
quadrata (Dichaetomyia), 360
quadrata (*Lophomala*), 360
quadrata (*Mydaea*), 360
quadrata monticola (Dichaetomyia), 361
quadrata nubiana (*Dichaetomyia*), 357
quadriremis (Morellia), 105
quadriseta (Helina), 535
quadristriata (*Limnophora*), 570
quadrum (*Musca*), 493
querceti (*Anthomyia*), 284
querceti (Dendrophaonia), 284
querceti (*Phaonia*), 284

rectinervis (Phaonia), 251
refixa (*Musca*), 132
Rhynchomydaea, 206
riparia (*Musca*), 554
riparia (*Ophyra*), 301
rubriventris (Phaonia), 243
rufa (Dichaetomyia), 377
rufescens (*Dichaetomyia*), 387, 388
ruficollis (Xenosina), 454
ruficornis (*Anaclysta*), 621
rufifrons (*Musca*), 55
rufipalpis (*Lyperosia*), 155
rufipes (*Haematobia*), 171, *172*
rufitarsis (*Cryptolucilia*), 123
rufitarsis (Orthellia), 123
rufitibia (*Graphomyia*), 550
Rypellia, 139, *145*

saltuum (Dasyphora), 143
saltuum (*Dasyphorina*), 139
sanguinolenta (Haematobia), 168, *172*
sanguinolentus (*Bdellolarynx*), 172
sanguisugens (Haematobia), 171
scapularis (*Musca*), 62
schillingsi (Lyperosia), 173
schmitzi (*Gymnostylina*), 192
scintillans (Pyrellia), 135
scolopax (*Haphospatha*), 179
scutellaris (*Mydaea*), 468
scutellaris (*Xenosina*), 447, 448
Scutellorthellia, 117

secunda (Mydaea), 480
secunda (*Pendleburyia*), 480
semimutata (*Mydaea*), 389, 400
senior whitei (Dichaetomyia), 352
senior whitei (Musca), 73
seriesetosa (Phaonia), 280
setifemur (Dichaetomyia), 404
setigera (*Musca*), 74
Setimusca, 91
setipennis (Xenosina), 448
setiventris (Helina), 531
siamensis (*Orthellia*), 127
similis (*Lasiopelta*), 466
similis (Xenosina), 466
similis septentrionalis (Xenosina), 467
simplicipes (Megophyra), 297
simulans (Dichaetomyia), 347
simulans (*Mydaea*), 347
simulans (Phaonia), 267
Siphona, 173
smaragdina (Morellia), 101
solennis (*Hydrotaea*), 460
solennis (*Mydaea*), 460
solennis (*Spilogaster*), 460
solennis (Xenosina), 460
sorbens (Musca), 40, *61*
sordida (*Mydaea*), 463
sordida (*Spilogaster*), 463
sordida (Xenosina), 463
sordidisquama (Morellia), 107
sordidissima (*Musca*), 55
sparsiseta (Xenosina), 445
sperata (Orthellia), 118
Spilaria, 493, 515
Spilogaster, 493
Spilogona, *611*; 612 (*Key*)
spinifemorata (*Eumyiospila*), 468, 490
spinigera (*Ophyra*), 304
spinipes (*Mydaea*), 492
spinohumera (*Musca*), 79
spinosa (*Musca*), 64
splendida (Dichaetomyia), 393
splendida (*Mydaea*), 393, 413
stabulans (*Musca*), 215, 216
stabulans (Muscina), 216
Steelea, 196
steini (Orthellia), 125
steini (Xenosia), 430
stella (*Pyrellia*), 124
Stenomitra, 117
stimulans (Lyperosiops), 168
stimulans (*Stomoxys*), 168
stipata rufitibia (Graphomyia), 550
Stomoxidinae, *150*; 151–153 (*Keys*)
Stomoxys, *156*; 157 (*Key*)
Stroblia, 554
Stygeromyia, 153
subcostalis (Buccophaonia), 213
subplumosa (Limnophora), 585
subtilis (Gymnodia), 624
subtilis (*Limnophora*), 624
subumbrosa (Dichaetomyia), 398
surda (*Atricia*), 554
surgens (Dichaetomyia), 339
suturalis (Limnophora), 593
Synthesiomyia, 624

Tamilomyia, 425
tarsalis (Xenosina), 446
tarsalis scutellaris (Xenosina), 448
tempestiva (Musca), 40, *65*
tenax (*Mydaea*), 442
tenax (Xenosina), 442
thirouxi (*Haphospatha*), 173
thomsoni (Phaonia), 232
tibialis (*Lyperosia*), 179
tibiella (Helina), 540
tibiella (*Mydaea*), 540
tibiseta (*Byomyia*), 73, 74
timorensis (*Lucilia*), 124
tinctipennis (Limnophora), 588
titillans (Lyperosia), 179
tonitrui (*Anthomyia*), 631
tonitrui (*Eulimnophora*), 631
tonitrui (Gymnodia), 631, *632*
tonitrui (*Limnophora*), 631
tonitrui canache (*Gymnodia*), 632
tonsa (*Heliographa*), 609
tonsa (Limnophora), 554, *609*
triangula (*Musca*), 554
triangularis (*Stomoxys*), 161
trichaeta (Helina), 502
triquetra (*Anthomyia*), 330
triseriata (Phaonia), 282
trisetosa (Helina), 503
trispina (*Orthellia*), 118
trita (*Lucilia*), 127
trochanterata (Xenosina), 442
tuberculifacies (*Mydaea*), 206, 207
tuberculifacies (Rhynchomydaea), 207

uliginosa (Helina), 535
uliginosa (*Musca*), 535
uliginosa (*Mydaea*), 535
umbratica (*Anthomyia*), 493, 508

umbratica (*Hebecnema*), 508
umbratica (Helina), 506, *508*
umbrosa (Dichaetomyia), 396
ungulata (*Mydaea*), 432
ungulata (*Xenosia*), 428, 432, 451
urbana (Mydaea), 485

varicauda (Dichaetomyia), 400
variegata (*Limnophora*), 631
varipalpis (Dichaetomyia), 388
veniseta (Limnophora), 582
venisetosa (Phaonia), 246
ventrosa (Musca), 60
versicolor (Dasyphora), 141
versicolor (*Musca*), 141
vetustissima (*Musca*), 61
viarum (*Musca*), 217
vicina (*Musca*), 55
victoria (*Ornithomusca*), 194
villeneuvei (Musca), 81
villeneuvii (*Musca*), 81
virago (Limnophora), 600
viridaurea (Morellia), 100
viridiceps (*Lucilia*), 124
viridifrons (*Lucilia*), 126, 127 (pars)
vitripennis (Musca), *57*, 58
vittata (*Graphomyia*), 548, 550 552
Viviparomusca, 41, *82*

xanthoceras (Pictia), 210
xanthoceras (*Spilogaster*), 210
xanthoceros (*Spilogaster*), 210
xanthomela (*Musca*), 60
xanthomelas (Musca), 65, *74*
xanthopleura (Phaonia), 250
xanthopus (Mydaea), 483
Xenosia, *428;* 429 (*Key*)
Xenosina, *433*; 435 (*Key*)

yerbury (*Musca*), 64

LIST OF SOME ADDRESSES FROM WHERE THIS PUBLICATION MAY BE HAD

Fauna of India Monographs

1. The High Commissioner for India,
India House,
London, W.C.2 (England).
(For all enquiries and orders from Europe and America).

2. The Superintendent,
Printing and Stationery,
Allahabad (Uttar Pradesh).

3. Kitabistan,
17-A, Kamla Nehru Market,
Allahabad (Uttar Pradesh).

4. Standard Book Depot,
Avenue Road,
Bangalore (Mysore State).

5. International Book House (P.) Ltd.,
Bangalore (Mysore State).

6. The Superintendent,
State Government Press,
Bhopal (Madhya Pradesh).

7. The Superintendent,
Printing and Stationery,
Queens Road,
Bombay.

8. New Book Co.,
188–190, Hornby Road,
Bombay.

9. International Agencies,
195, Hornby Road,
Bombay.

10. Chakravarty, Chatterjee & Co., Ltd.,
15, College Square,
Calcutta (West Bengal).

11. Das Gupta & Co., Ltd.,
54/3, College Street,
Calcutta (West Bengal).

12. W. Newman & Co., Ltd.,
3, Old Court House Street,
Calcutta (West Bengal).

13. Oxford Book & Stationery Co.,
17, Park Street,
Calcutta-17 (West Bengal).

14. Thacker, Spink & Co. (1933), Ltd.,
Calcutta (West Bengal).

15. The Superintendent,
Government Printing and Stationery,
Chandigarh (Punjab).

16. The Press Officer,
Orissa Secretariat,
Cuttack (Orissa).

17. Manager of Publications,
Government of India,
Civil Lines,
Delhi-8.

18. Atma Ram & Sons,
Kashmeri Gate,
Delhi.

19. Director,
Government Press,
Hyderabad
(Andhra Pradesh).

20. Soochna Sahitya Depot
(State Book Depot),
Lucknow (Uttar Pradesh).

21. The Superintendent,
Government Press,
Mount Road,
Madras.

22. The Superintendent,
Government Printing,
Nagpur (Maharashtra).

23. Oxford Book & Stationery
Co.,
Scindia House,
New Delhi.

24. Ram Krishna & Sons,
13/13, Connaught Place,
New Delhi.

25. The Superintendent,
Government Printing,
Patna (Bihar).

26. The Superintendent,
Assam Secretariat Press,
Shillong (Assam).

27. The Superintendent,
Government Press,
Simla (Himachal Pradesh).

28. The Kashmir Bookshop,
Residency Road,
Srinagar (Jammu and
Kashmir).

29. The Superintendent,
Government Press,
Trivandrum (Kerala).